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EDITORIAL

Vegetable Variety Trials. The investigation, started by the Department of Agriculture in 1948, into the possibilities of widening the range of vegetables grown by gardeners at Cameron Highlands was continued during 1949, and an article in this issue of the Journal gives details of the experiments carried out in this second year of investigation.

The investigation was instituted in an endeavour to encourage growers to increase the number of types of vegetables grown instead of relying on cabbage and, to a lesser extent, Chinese cabbage *(Pe-tsai)*, Chinese radish *(lobak)*, carrots, leeks and tomatoes.

The trials have been a success, and while many types of vegetables are recommended for permanent introduction others are to be tested again in future trials. Much interest has been shown by the growers and there has been a heavy demand for seed.

Many of the conclusions reached in the 1948 trials were confirmed in 1949, and, in addition, some new introductions showed promise, especially Holland potatoes which yielded well and, what is most important, appeared to be resistant to disease.

The Purchase and Bulk-Processing of Smallholding Latex. A recent development in some areas of the two northern States of Kedah and Perlis has provided a brighter outlook for the future for owners of rubber smallholdings in these areas. It is the purchase, by licensed agents, and subsequent bulk-processing of the smallholder's latex. There are several buying agents operating, some of them processing the latex themselves, and others selling it to large estates in the area.

The inability of the smallholder to produce rubber sheet of the same quality as that produced on large estates has meant a financial loss to the producer and has been detrimental to the rubber industry as a whole. This recent development in Kedah and Perlis has shewn smallholders that, by selling their rubber as latex instead of processed sheet, they are able to maintain their income from rubber and also have time to turn to additional gainful occupations. In addition, because of the more efficient means of processing the latex, this development ensures that a far greater percentage of smallholders' rubber arrives on the market as a first class, readily saleable product.

These organisations for buying and bulk-processing smallholding rubber are only in their infancy and have had the advantage of operating at a time when there has been a continual rise in the price of rubber and the

market has favoured a delayed rather than a quick profit. As the author of the article in this issue of the Journal points out, it remains to be seen whether the small businesses will survive once the price becomes stabilised at a figure probably far below that now obtainable.

This method of disposing of smallholding rubber provides plenty of scope for the setting up of co-operative movements in the villages but, as with the organisations already operating, expert supervision of each unit will be necessary. Each unit would have to be run efficiently with skilled labour at the factory end, an efficient clerk-accountant and maximum co-operation and production from the man who is going to gain most—the smallholder.

A Census of Mechanical Field Equipment in use in Malaya.

With the increased use of mechanical field equipment in Malaya it became desirable for the Department of Agriculture to know how much, what kinds and where such equipment was being used. A questionnaire was prepared and, with the assistance of the Registrar of Statistics, Federation of Malaya, circulated to all rubber, coconut, oil palm and tea estates of 100 acres and over. Although the census was limited to these types or agricultural undertakings, it is considered that the information obtained gave a fairly accurate picture of the amount of mechanical equipment in use.

The replies to the questionnaire were, on the whole, satisfactory, although some confusion did arise because of the questionnaire being insufficiently detailed in its classification. A new form of questionnaire has been drawn up to overcome this defect.

The information obtained from analysis of the replies to the questionnaire is of value to the Department of Agriculture both in its advisory work and in the preparation of plans for future agronomic investigations.

A report, included in this number of the Journal, describes the census and supplies statistics of the various types of tractors and tractor-implements in use in each of the States and Settlements that go to make up the Federation of Malaya.

The authors of the report consider that, with the rapid increase in the use of mechanical field equipment, the census should be carried out annually for at least the next three years.

Pig Improvement in Penang.

In the years just prior to the Second World War, as a result of research and extension work of the Department of Agriculture, the practice of mating European-type boars with Chinese sows became increasingly popular with the Chinese pig-rearers in Malaya. The cross-bred progeny, when properly fed, were found to possess better growth characteristics and to form carcases more suitable to market requirements than the local Chinese pig. An article in this issue of the Journal describes how the work of the Department of Agriculture and the pig-rearers in Penang ceased when the Japanese occupied Malaya, how the condition of pigs in the Settlement deteriorated and how, since the war, efforts have been made to regain the confidence of the pig-rearer and once more improve the local pigs on a similar basis of cross breeding.

Original Articles.

VEGETABLE VARIETY TRIALS AT CAMERON HIGHLANDS IN 1949

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Introduction.

The reasons for conducting an investigation with various varieties of vegetables at Cameron Highlands are given in an article by E. F. Allen in the *Malayan Agricultural Journal* for January, 1950. This article gives details of the experiments carried out in 1949, in continuation of the general investigation.

Origin of Seed.

In addition to the sources mentioned in the previous article, seed was received from Messrs. Peter Henderson of the United States of America and from Japan. All sources from which seed has been obtained are shown in the list below. The abbreviation shown, indicates the source in the tables given later in this article.

Australia	A
Burpee's, U.S.A.	B
China	C
Holland	D
Goviers, Canada	G
Henderson's, U.S.A.	H
India	I
Java	J
Local (Cameron Highlands) ..	L
Japan	N
Yates', Australia	Y
Zwaan's, Holland	Z

Experimental Methods.

The layouts used in the trials and the mathematical methods used to test the significance of the figures obtained were the same as those used in the previous year.

The Experiments.

ROOTCROPS.

Beet. (Experiment C.H. 6/49).

Trials in 1948 had shown that Burpee's Lutz Green Leaf was an outstanding variety as it yielded heavily and was far superior in quality

to the other varieties under trial. In this trial further American varieties were tested using Burpee's Lutz Green Leaf as a control. The varieties tested, their origin and yields are shown in Table I.

Table I.

The Results of a Beetroot Trial.

Variety.	Origin.	Total yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 6/49.)				
Green Top Wonder ..	H	845	98	14,434
Crosby's Egyptian Special	H	740	86	12,641
Extra Early Egyptian ..	H	780	91	13,324
Lutz Green Leaf ..	B	1,095	127	18,705
Detroit Dark Red ..	H	835	97	14,264
Mean ..		859	100	14,674

Once again Lutz Green Leaf has been proved to be superior in yield and quality. It was extremely vigorous in growth and has the ability of maintaining its condition without dying back when kept in the soil for several months. Crosby's Egyptian Special had very few leaves and the shape of the beet was flat. Extra Early Egyptian was small and much of its root grew above the surface of the soil. The Green Top Wonder in spite of its name had the centre leaves only slightly green, the remainder being red. Detroit Dark Red is a robust growing beet but it cannot excel the Lutz Green Leaf.

Carrots. (Experiment C.H. 11/49).

Previous experiments, in spite of their yield figures not reaching statistical significance, had shown that growers preferred Manchester Table to all other varieties. In the present experiment this variety was tested against recently imported American varieties. The varieties tested, their origin and yields are shown in Table II.

Table II.

The Results of a Carrot Trial.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 11/49.)				
Nantes Half Long ..	H	534	87	7,754
Henderson's Tender-Sweet	H	498	82	7,231
Chantenay Long Type ..	H	582	95	8,451
Manchester Table ..	Y	825	135	11,979
Mean ..		609.7	100	8,854

In spite of the wet weather all the varieties in this trial did well. Manchester Table was more vigorous than the Henderson varieties. Henderson's Tender-Sweet had a dark, purplish-green leaf stalk and was fairly robust in growth. The crop was free from pests and diseases. The Henderson's Tender-Sweet was different from the other varieties in that it is sweet, tender and has a beautiful orange-red colour. In spite of this, the dealers prefer Manchester Table which is also a very fine carrot. The cores are small and the flesh is very close in texture.

Potatoes (Holland). (Experiment C.H. 20/49).

Local vegetable planters grow a considerable area of potatoes each year, seed tubers being purchased from the local shops which obtain their supplies from Australia. What the varieties are is unknown but crops are never resistant to potato blight *(Phytophthora infestans)*. Heavy spraying has, therefore, to be carried out and failures are frequent, especially in wet weather. Seeds of certain varieties reputed to be disease resistant were therefore imported from Holland and tested against seed from Australia bought in the local shops. The varieties tested, their origin and yields are shown in Table III.

Table III.
The Results of a Potato Trial.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 20/49.)				
Bevelander ..	D	45.5	70	8,258
Meerlander ..	D	68.0	104	12,342
Z.P.C. 40405 ..	D	60.5	93	10,980
Voran ..	D	102.5	157	18,603
Prummel ..	D	71.9	110	13,050
Sneeuw ..	D	66.1	102	11,997
Local ..	A	49.5	76	8,984
Alpha ..	D	60.5	93	10,980
Dorst U. 243 ..	D	69.5	107	12,614
Eigenheimer ..	D	56.5	87	10,254
Mean ..		65.05	100	11,806

Germination was good and stands in all the beds were even. Meerlander and Eigenheimer made the most vigorous growth. The growth of the other varieties was good, but, unfortunately, the area was flooded twice during the growing period. Heavy spraying with Bordeaux Mixture at weekly intervals was done and the local variety showed symptoms of disease immediately after the flood, in spite of heavy spraying. After the second flood, the stems of the potatoes, instead of being erect, covered the ground in thick layers. Spraying was continued until harvest, when the leaves had dried up. The Holland potatoes appeared to be resistant to disease.

Dorst U. 243 was a pink variety; the remainder were white potatoes. The Holland potatoes were large, smooth and with tuber of handsome, flattish oval form. They all keep well and are not liable to scab or decay. The quality was good and for size, Voran was much favoured. This variety is probably worth introducing.

Parsnips. (Expt. C.H. 24/49).

In general there is a good demand for parsnips in Malaya and growers order their seed from Australia at short intervals in order to receive it in fresh condition. Previous trials conducted with this vegetable have failed owing to the difficulty of obtaining seed of several varieties in good condition at the same time. In this trial, seeds were received from America and Australia by air mail and were planted immediately on arrival. The varieties tested, their origin and yields are shown in Table IV.

Table IV.

The Results of a Parsnip Trial.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 24/49.)				
Yates' Hollow Crown ..	Y	1,990	98	28,675
Burpee's Guernsey ..	B	2,020	100	29,330
Burpee's All American ..	B	1,965	97	28,531
Burpee's Long Smooth Hollow Crown ..	B	2,115	104	30,709
Mean ..		2,022.5	100	29,311

The crop was fairly even and as there was no damage by pests or diseases the yields were good. All the varieties produced very similar yields, differences not being statistically significant. Since Yates' Hollow Crown is satisfactory there is no reason to introduce the American varieties. Furthermore, with seeds in which viability falls off rapidly the shorter journey from Australia is preferable to the longer one from America.

Chinese Turnip (Expt. C.H. 30/49).

The Japanese, during their occupation of Malaya, introduced various types of vegetables to Cameron Highlands including varieties of Chinese turnip, which the Japanese called Taikong, Chinese cabbage (Pe-tsai) and carrots. The local growers were especially interested in the first two of these varieties and at their request a consignment of Chinese turnip and Chinese cabbage seed was imported from Japan. The varieties of turnip tested, their origin and yields are shown in Table V.

Table V.

The Results of a Taikong (Chinese Lobak) Trial.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 30/49.)				
Nerima Dainaga Takuan ..	N	76.5	72	15,427
Nerima Dainaga Marujiri	N	85.0	80	17,141
Riso ..	N	82.5	78	16,637
Shogoin Daimaru ..	N	149.5	141	30,149
Tokinashi ..	N	71.0	67	14,318
Mino Kokonoka ..	N	126.0	119	25,410
Suikomi Ninengo ..	N	122.5	115	24,704
Miyashige ..	N	109.5	103	22,082
Local ..	L	134.0	126	27,023
Mean ..		106.3	100	21,432

Shogoin Daimaru proved to be an outstanding introduction as it yielded heavily and was of very good quality. Its growth was robust and it was free from attack by pests and diseases. The roots are round in shape, rather similar to that of a turnip.

Mino Kokonoka and Suikomi Ninengo are also worth importing as they too are of excellent quality. The roots were long and cylindrical in shape and the meat was white and of good taste. It is difficult to produce seed of these varieties locally, and seed raised at Cameron Highlands from plants which probably originated from Japan cost $4.00 (Malayan) per tahil*, whereas seed may be obtained from Japan at U.S. 55 cents per lb.

LEGUMES.

Green Peas. (Expt. C.H. 2/49).

A variety, Earlicrop, seed of which is produced locally, has been previously shown to be far superior in yielding capacity to all other varieties so far imported. It was therefore tested against varieties imported from the U.S.A. The varieties tested, their origin and yields are shown in Table VI.

Table VI.

The Results of a Green Pea Trial.

Variety.	Origin	Total Yield in lbs.	Yield as Percentage of Mean	Yield in lbs. per acre.
(Expt. C.H. 2/49.)				
Laxtonian ..	H	57	75	690
Earlicrop ..	L	216	283	2,614
Telephone ..	H	29	38	351
Early Delicious ..	H	34	45	411
Prosperity ..	H	45	59	545
Mean ..		76.2	100	922

*1 tahil = 1.33 ounces.

Once again the local variety Earlicrop proved to be by far the best, both in yield and in growth. It is well acclimatized and can produce good crops at all times of the year. The American peas were of excellent quality. Unfortunately they did not grow well and the plants wilted before harvest. It is considered that as the local market is satisfied with Earlicrop there is no necessity to import other varieties from America, but some United Kingdom varieties might well be tested.

French Beans. (Climbing varieties) (Expt. C.H. 5/49).

In the past, all the French bean varieties tried have been of the bush type, except for the variety Boentjis from Java. Important though they are, local growers nevertheless want a French bean which has a longer harvesting period than the usual bush types. Climbing French beans, often called "Pole Beans", were therefore imported and tested against the local variety. The varieties tested, their origin and yields are shown in Table VII.

Table VII.

The Results of a French Bean Trial.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 5/49.)				
Yates' Kentucky Wonder	Y	682	73	5,894
St. Louis Perfection ..	H	1,098	118	9,490
Kentucky Wonder ..	H	1,013	109	8,755
Mean ..		931	100	8,046

The growth of all varieties was satisfactory, that of Yates' Kentucky Wonder being especially robust. St. Louis Perfection, however, had a large bean 6 to 8 ins. long, stringless, plump, tender and of good flavour, and most dealers were in favour of it. Henderson's Kentucky Wonder was definitely better than the Yates' variety in quality and size, but nevertheless the latter variety gave a very good harvest at the start and was earlier than the other varieties but it had a short life and harvest was almost completed when the others began to produce beans. It is considered that further introductions of St. Louis Perfection would be valuable until such time as seed can be raised locally for supply to growers at Cameron Highlands.

French Bean. (Dwarf varieties) (Expt.. C.H. 32/49).

In 1948, the American varieties Tender Green and Dwarf Stringless Green Pod did better than the normal variety grown at Cameron Highlands, which is Canadian Wonder of Australian origin. In 1949, a further experiment was conducted with the same varieties, with Tender Pod in addition. Their origin and yields are shown in Table VIII.

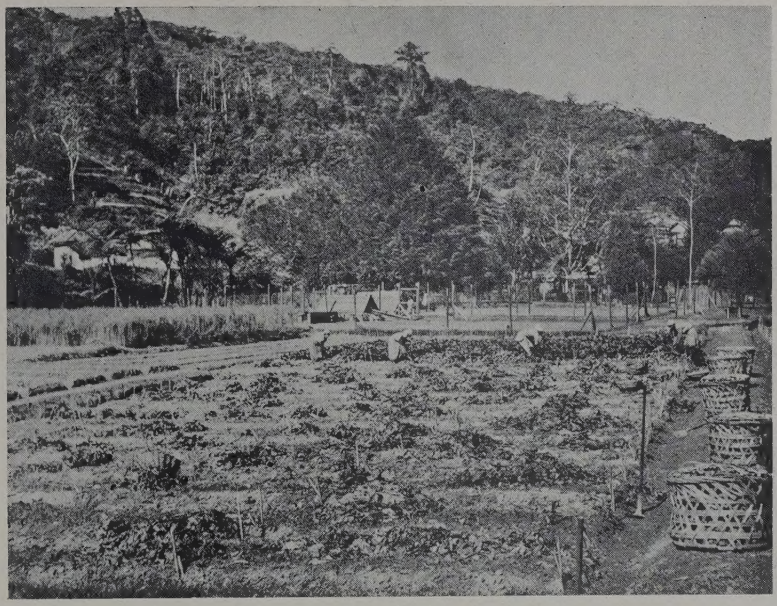

PLATE I.
General view of some experimental plots being harvested.

PLATE II.
Celery—Golden Self-blanching.

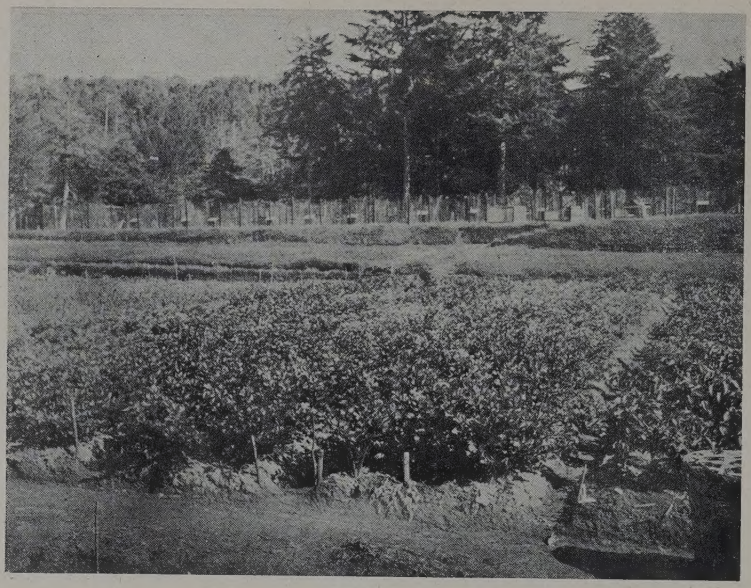

PLATE III.
A celery varietal trial ready for harvest.

PLATE IV.
Harvested beetroots ready for weighing.

Table VIII.

The Results of a French Bean Trial.

Variety.	Origin.	Total yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 32/49.)				
Tender Pod ..	B	664	94	4,591
Stringless Green Pod ..	B	577	81	3,990
Tender Green ..	B	736	104	5,089
Australian Canadian Wonder ..	A	857	121	5,926
Mean ..		708.5	100	4,899

Canadian Wonder has, in this case, done better than the American varieties and may be considered to be satisfactory.

Lima Bean (Expt. C.H. 1/49.)

Trials with a single American variety had been conducted in 1948, and, in 1949, this variety was tested against other American varieties, which, with their origin and yields, are shown in Table IX.

Table IX.

The Results of a Lima Bean Trial.

Variety.	Origin.	Yield of Green Pods.			Yield of Ripe Seed.		
		Total in lbs.	As Percentage of Mean.	In lbs. per acre.	Total in lbs.	As Percentage of Mean.	In lbs. per acre.
(Expt. C.H. 1/49.)							
Fordhook ..	H	317	77	2,739	126	76	1,089
Early Giant ..	H	176	43	1,521	66	40	570
Improved ..	H	750	181	6,482	305	184	2,636
Mean ..		414	100	3,581	166	100	1,432

Henderson's Improved was by far the best in both yield and quality, but seed is expensive and the crop is not economical.

GOURDS.

Cucumber. (Expt. C.H. 15/49.)

In previous trials, Burpee's Hybrid had been shown to be extremely vigorous and to be capable of yielding heavy crops. In this trial, six varieties from America were, therefore, tested against it. The varieties tested, their origin and yields are shown in Table X.

Table X.
The Results of a Cucumber Trial.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 15/49.)				
Black Diamond ..	H	409	84	5,302
The Henderson ..	H	481	98	5,977
Marketer ..	H	408	84	5,289
Straight Eight ..	H	378	77	4,900
A & C ..	H	391	80	5,069
Colorado ..	H	433	89	5,613
Burpee's Hybrid ..	B	922	189	11,953
Mean ..		489	100	6,300

Of the American varieties, the only one to make good growth was A & C. Black Diamond and Straight Eight grew badly but in spite of this they produced some fruit of good quality. Burpee's Hybrid was well up to the Henderson varieties in quality and, in addition, was even in growth, extremely prolific, and can stand adverse weather conditions. As it is a hybrid, however, seed cannot be produced locally and the cost from America is high.

Leaf Vegetables.

Chinese Cabbage (Pe-tsai). (Expts. C.H. 7/49, 29/49 & 31/49).

In previous trials Burpee's Pe-tsai has been proved to be a Chinese cabbage of very good quality. In these trials, seeds from America, China and Japan were tested against the local variety. The varieties tested, their origin and yields are shown in Table XI.

Table XI.
The Results of Three Pe-Tsai Trials.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 7/49.)				
Chinese ..	L	3,870	102	29,267
Chi-hi-li ..	H	3,710	98	28,057
Mean		3,790	100	28,662
(Expt. C.H. 29/49.)				
Pe-tsai (Dwarf) ..	A	5,127	99	31,018
Wong Bok (Tall) ..	A	6,517	126	39,428
Wan-chai (Ball-shape) ..	C	3,840	74	23,232
Mean		5,161	100	31,226

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 31/49.)				
Hotoren ..	N	1,605	118	36,413
Chihfu ..	N	1,500	110	34,031
Aichi ..	N	1,720	127	39,022
Matsu Shima ..	N	1,390	102	31,535
Chirimen ..	N	990	73	22,460
Hankekkyo Santo ..	N	1,230	91	27,905
Bansei Shirona ..	N	1,330	98	30,174
Kashin ..	N	1,360	100	30,855
Chosen ..	N	965	71	21,893
Pe-tsai (Dwarf) ..	A	1,490	110	33,804
Mean		1,358	100	30,809

In the first trial, the Chinese variety which is of the type known as "Wong Bok" yielded well and gave well blanched hearts which were snow-white and tender. The Chi-hi-li was a green Chinese cabbage which had to be blanched artificially. Although crisp and of good flavour it is considered that the need for this artificial blanching will be against its being grown on a large scale.

In the second trial, the imported Pe-tsai seed from China, obtained from some local dealers, was tried and it was found that this variety gave the poorest yield. The quality was excellent, and, being shaped like a cabbage, it has a very compact heart which the Chinese say will be very heavy if properly manured. This variety may be worth another trial with heavy manuring.

The last trial was with seeds imported from Japan. The Aichi and Chihfu were extremely good varieties. They have the shape of the Early Jersey Wakefield cabbage and have very compact hearts. The local growers are very anxious to have these two varieties introduced. They are exceptionally vigorous and have strong resistance to stem rot.

The other varieties are leafy vegetables and are therefore not required by the Highland growers but may be suitable for market gardens on the plains.

Cabbage. (Expt. C.H. 8/49).

The common, local Yates' Utility was tested against four American varieties. Their origin and yields are shown in Table XII.

Table XII.

The Results of a Cabbage Trial.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 8/49.)				
Henderson's Premier ..	H	1,275	78	20,570
Late Flat Dutch ..	H	1,750	108	28,233
Danish Ball Head ..	H	1,395	86	21,925
Utility (Local) ..	L	1,800	111	29,040
Henderson's Succession ..	H	1,910	117	30,814
Mean		1,626	100	26,116

Growth was satisfactory and the maturation periods recorded were as follows:—

Henderson's Premier	..	89 days
Late Flat Dutch	..	127 ,,
Danish Ball Head	..	120 ,,
Utility (Local)	..	90 ,,
Henderson's Succession	..	103 ,,

Henderson's Succession was the best of the imported varieties. It matured in 103 days, was of medium size, low growing and with very compact, round heads. Utility matured in 90 days from rooted suckers and had very compact round heads. The Danish Ball Head was very susceptible to disease. The Late Flat Dutch was a late variety and was also very coarse. The Henderson's Premier was small.

For propagation by suckers, the local variety excelled all the others. The Henderson's varieties produced weak suckers which failed to root.

Cauliflower. (Expts. C.H. 12/49 and 26/49).

Burpeana which had, in previous trials, been proved to be an extremely heavy yielder of good quality was tested against new varieties imported from the U.S.A.

The varieties tested, their origin and yields are shown in Table XIII.

Table XIII.

The Results of Two Cauliflower Trials.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 12/49.)				
Early Snowwhite ..	H	344	105	7,135
Burpeana ..	B	506	154	10,495
Super Snowball ..	H	230	70	4,770
Henderson's Primosnow ..	H	270	82	5,600
Improved Holland Export ..	H	290	88	6,077
Mean		328	100	6,815
(Expt. C.H. 26/49.)				
Improved Holland Export	H	158	98	2,549
Super Snowball ..	H	207	128	3,339
Primosnow ..	H	139	86	2,242
Early Snowwhite ..	H	142	88	2,290
Mean		161.5	100	2,605

In the first trial, Burpeana was obviously the best variety to choose. Although the weather was very wet when this experiment was in progress, this variety produced large heads and much better yield than the Henderson varieties.

The second trial was undertaken to see if any of the Henderson varieties would be of any value when grown in dry seasons. It was found that the Henderson's Super Snowball gave significantly greater yield than the rest. The growers here consider Burpeana to be the best variety for local conditions and would not recommend any of the Henderson varieties.

Celery. (Expt. C.H. 13/49.)

New varieties from Hendersons, U.S.A., were tested against the local Chinese variety in the same way as the Burpee's varieties were tested against the same variety in 1948. The varieties tested, their origin and yields are shown in Table XIV.

Table XIV.
The Results of a Celery Trial.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 13/49.)				
Supreme Golden ..	H	1,330	98	12,070
Local Chinese ..	C	1,610	118	14,586
Golden Plume ..	H	1,230	90	11,162
Utah Green Variety ..	H	1,280	94	11,616
Mean		1,362.5	100	12,359

The Chinese variety had robust growth while the imported celery was stunted. Leaf disease was very severe among the imported varieties.

The quality of Henderson's celery was good, but owing to the low yield and susceptibility to disease, none of the varieties should be introduced.

Leeks. (Expt. C.H. 16/49).

This is an important crop and there is always a big demand for the vegetable during festival seasons. Leeks are very hardy and may be kept in the ground for a considerable period if the price is bad. Locally grown varieties are small, and it was intended to introduce varieties of better quality into the Highlands. An experiment was conducted in 1949, and the varieties tested, their origin and yields, are shown in Table XV.

Table XV.
The Results of a Leek Trial.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 16/49.)				
Musselburgh ..	Y	1,630	97	19,723
American Flag ..	H	1,750	104	21,175
Large Musselburgh ..	H	1,630	97	19,723
American Flag ..	B	1,740	103	21,054
Mean		1,687.5	100	20,419

All the varieties showed good growth and there were no pests or diseases present. Owing to the good yields from all the varieties, the yield differences were all statistically insignificant. American Flag was of excellent quality, but since the Yates' variety is satisfactory, both in yield and quality, the introduction of the American varieties is not recommended. It is understood, however, that American Flag is now available in Australia.

Lettuce. (Expts. C. H. 17/49 and 23/49).

The Australian Imperial 847 gave the heaviest yield in the previous trials. In these two trials, the Henderson seeds were introduced and were planted, firstly in wet weather and later in dry weather. The varieties tested, their origin and yields, are shown in Table XVI.

Table XVI.

The Results of Two Lettuce Trials.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 17/49.)				
Imperial No. 44 ..	H	465	118	14,468
New York No. 515 ..	H	422	107	13,130
Imperial No. 456 ..	H	425	107	13,224
Special White Boston ..	H	286	72	8,899
Imperial 847 ..	Y	429	108	13,348
Burpee's Big White Boston	B	269	68	8,370
Great Lake ..	H	472	119	14,686
Mean		395.4	100	12,304
(Expt. C.H. 23/49.)				
New York Special ..	A	2,690	111	22,975
Imperial No. 847 ..	A	3,225	133	27,545
Big White Boston ..	B	1,262	52	10,778
Imperial No. 456 ..	H	2,520	104	21,523
Great Lake ..	H	2,395	99	20,456
Mean		2,418.4	100	20,655

In the first trial, varieties Great Lake, Imperial No. 44, Imperial 847, Imperial No. 456 and New York No. 515 gave significantly greater yields than varieties Special White Boston and Burpee's Big White Boston which are butter-head type of lettuces with yellow leaf. All the crisp head, green leaf varieties were doing well in spite of the very wet weather. The Great Lake has coarser leaves than the other varieties and it seemed to stand the weather better than the rest.

In the second trial, the Australian black seeded Imperial 847, gave significantly the largest yield. Owing to the dry weather, the crop did extremely well and there were no pests or diseases present.

The Burpee's variety (a butter-head type) was harvested 39 days after transplanting and the other varieties at 53 days. All the varieties formed solid, crisp heads. All the local dealers prefer the Imperial 847; in view of its success the importation of the American lettuce seed is unwarranted.

MISCELLANEOUS.

Rhubarb. (Expt. C.H. 21/49).

Preliminary selection of a large number of rhubarb seedlings gave 20 plants which showed signs of being extremely promising, and these were planted out as lines in May, 1948. One line in particular, No. 12, was excellent in all characters, while two other lines, Nos. 7 and 15, were also good. These three varieties were accordingly tested in a varietal trial and the results are shown in Table XVII.

Table XVII.

The Results of a Rhubarb Trial.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 21/49.)				
RH — CH — 7 ..	A	635	75	10,976
RH — CH — 15 ..	A	853	100	14,745
RH — CH — 12 ..	A	1,065	125	18,409
Mean		851	100	14,710

Line No. 12 has been shown to be an extremely heavy yielder. In addition, samples were analysed chemically and received a very favourable report. It appears, therefore, to be suitable for cultivation on a large scale at Cameron Highlands, and steps are being taken to increase the amount of planting material available.

Sweet Corn. (Expt. 3/49 and 14/49).

The Burpee's Stowell's Evergreen Hybrid proved to be an outstanding variety in the previous trials. In these trials, the Henderson seeds were tested and the varieties tested, their origin and yields are shown in Table XVIII.

Table XVIII.

The Results of Two Sweet Corn Trials.

Variety.	Origin.	Total Yield in lbs.	Yield as Percentage of Mean.	Yield in lbs. per acre.
(Expt. C.H. 3/49.)				
Iona ..	H	2,992	85	12,930
Sunlite ..	H	2,409	68	10,410
Stowell's Evergreen Hybrid	B	5,205	147	22,493
Mean		3,535	100	15,277
(Expt. C.H. 14/49.)				
Cream O'Gold ..	H	1,180	129	10,708
Golden Cross Bantam ..	H	710	77	6,443
Stowell's Evergreen Hybrid	B	950	104	8,621
White Hybrid ..	H	930	101	8,439
Marcross C13 x C6 ..	H	800	87	7,260
Mean		914	100	8,294

In the first trial, the Stowell's Evergreen Hybrid was significantly better than the rest. There was little to choose between the three varieties as regards quality, which was good, but in size of cobs and in yield, the Stowell's Evergreen Hybrid was ahead of the others.

In the second trial Cream O'Gold and Stowell's Evergreen Hybrid were the most vigorous and uniform and yielded significantly better than the rest. Of the two, Cream O'Gold was possibly the better, many stalks producing two full ears some 9 ins. long containing 8 to 10 rows of grain. It matured in 90 days.

White Hybrid, Marcross and Golden Cross Bantam made slow and poor growth, and the stalks of these varieties produced mostly single small size ears of good quality corn. The Marcross was a much earlier variety than the others.

In addition to Stowell's Evergreen Hybrid, Cream O'Gold appeared to be the best introduction. This variety had attractive creamy-yellow, deep and full kernels. The core was very small and the edible portion was greater than in the other varieties.

Conclusions and Proposals for Future Trials.

The results of this series of experiments, which has been conducted over a period of two years, are shown below, together with proposals for further importations and trials where considered necessary.

ROOTCROPS.

Beet.

The American "Lutz Green Leaf" has been shown to be outstanding, Further trials are necessary to see if any varieties of similar quality and yield capacity can be imported from Sterling areas, and attempts should be made to produce seed of "Lutz Green Leaf" locally.

Carrots.

"Manchester Table" from Australian seed gives satisfactory results and no further trials are necessary.

Potatoes.

The Dutch variety "Voran" has been proved to be a heavy cropper and a good keeper, but although the first generation appeared to be resistant to blight, later generations were unproductive. Future investigations should be concerned largely with blight resistance, with special attention being paid to ease of obtaining supplies of seed.

Parsnip.

"Hollow Crown" from Australia appears to be satisfactory and no further investigations are proposed at present.

Radish.

"French Breakfast" from Australia has been shown to be as good as any of the American varieties. No further investigations with American seed are envisaged, but trials with new varieties from Australia will be conducted.

Turnip.

The Australian variety "Champion Purple Top" has been shown to be superior to other varieties tested and no further experiments are necessary.

Turnip, Chinese. (*lobak*)

"Shogoin Daimaru", "Mino Kokonoka" and "Suikomi Ninengo" are outstanding Japanese varieties. There are many more varieties which have not yet been tried locally, and importation of seeds from Japan should be made and the best varieties, if any, should be tried against these three imported varieties and against local varieties.

LEGUMES.

Green Peas.

The Australian variety "Earlicrop", has been proved to be far superior in yielding capacity to all other varieties so far imported, but the size of pea is hardly satisfactory. It is considered that a better variety could be more easily obtained by importing a range of varieties from United Kingdom and Australia, where much breeding work has been conducted, rather than by crossbreeding at Cameron Highlands.

Sugar Peas.

The local variety yields well but the American "Maule's Giant Sugar Pod" is of better quality. As there is a steady demand for this vegetable, further trials with seed imported from both America and Australia should be conducted.

French Beans (*Climbing Varieties*).

"St. Louis Perfection" may be worth importing for a trial against Hawaiian varieties, which are said to be rust resistant and capable of producing large yields. Further trials with Burpee's "Tender Green" against the best local variety may give valuable results.

French Beans (*Dwarf Varieties*).

"Canadian Wonder", seed of which may be obtained cheaply from Australia, is a satisfactory variety and no further trials are envisaged.

Lima Beans.

This is a luxury crop which grows only in dry weather. The best variety tested was "Fordhook 242" from America but seed is expensive and the crop is probably not economic. No further trials are envisaged.

GOURDS.

Cucumbers.

The seed of Burpee's "Hybrid" is too expensive for local growers to use. Australian or English varieties should be tried in an attempt to find a cheap source of good seed.

Squash.

The variety "English Vegetable Marrow", seed of which was obtained from Canada, was satisfactory. It should be tested against future importations from the United Kingdom and Australia.

LEAF VEGETABLES.

Cabbage, Chinese (*Pe-Tsai*).

The two Japanese Pe-tsai, "Aichi" and "Chihfu", should be tried again with the Burpee's Pe-tsai and the Chinese "Wan-chai". The local growers favour the Japanese varieties as they are heavier yielders, of better quality, and their seed is cheaper than that of other varieties.

Cabbage.

The variety "Utility" of Australian origin but now reproduced locally by means of suckers, is highly satisfactory. Any further investigations should include sucker rooting trials with plant hormones.

Cauliflower.

"Burpeana", an American variety, is satisfactory; it should be tested against the Australian varieties to ascertain if any of them can compete with it.

Celery.

"Golden Self Blanching" from America has done well, but the local Chinese variety is also good. Future trials with self blanching varieties from United Kingdom and America should be conducted.

Leeks.

"American Flag" and "Musselburgh," seed of both of which can be obtained from Australia, are satisfactory. No further trials on this crop are necessary at present.

Lettuce.

The Australian variety "Imperial 847" is satisfactory and does well in all conditions. There is no difficulty over seed supplies and no further investigation work is contemplated at present.

Spinach.

Although there are several good species of spinach which thrive on the plains, there is a small demand for upland types. Certain varieties from Holland, tested in 1948, gave little promise of success but tests with Australian and Japanese varieties are contemplated.

MISCELLANEOUS.

Rhubarb.

A variety selected locally, C.H. 12, has been shown to be satisfactory. Further varieties will be obtained from Australia to test against it.

Sweet Corn.

The American varieties "Stowell's Evergreen Hybrid" and "Cream of Gold" have been shown to be satisfactory but as there is no demand locally, except by a few Europeans, no further work is contemplated.

Sweet Pepper or Capsicum.

The American varieties "Merrimack Wonder" and "Early Pimento"

were good in both yields and quality. Future trials will be conducted with American and United Kingdom varieties.

Tomato.

Seed selected locally is normally used and gives satisfactory results. Varieties from America, Australia and the United Kingdom should be tested.

Acknowledgement.

These trials were initiated by Dr. A. E. S. McIntosh, Deputy Director of Agriculture, and the varieties and statistical layouts used were decided by Mr. E. F. Allen, then Acting State Agricultural Officer, Perak.

THE PURCHASE AND BULK-PROCESSING OF SMALLHOLDING LATEX

BY

J. Cook,

Agricultural Officer, Kedah.

During the last 18 months a development has taken place in Kedah and Perlis possessing possible far-reaching consequences to the rubber industry. It is the purchase of latex derived from rubber smallholdings and its subsequent bulk-processing either by smallholders or by large commercial concerns. The former have come to recognise the financial benefits to be accrued by doing this, while the latter look upon the smallholdings as a convenient pool for increased production of concentrated latex or crepe. Objectively, this development has resulted in better profits to primary producers, the fostering of the rudiments of a form of co-operative agriculture and, most important from the rubber industry point of view, the production of enhanced quality rubber in place of the low-grade product usually associated with smallholdings. Producers or agents selling latex for production of concentrated latex must take precautions against pre-coagulation and to this end ammonia is kept at collecting centres.

Malayan American Plantations, Limited (Harvard Estate), was a buyer of smallholding latex during the latter part of 1948, and early 1949. Purchases were discontinued in February. So popular, however, had this development proved amongst local smallholders that an influential Malay, Haji Ahmad of Kuala Muda, Kedah, who had acted as buying agent for the estate, undertook, with material and financial backing from the Rubber Research Institute of Malaya, to continue the latex purchase system and to set up his own processing centre at Merbok, Kedah. From the inception of the scheme in March, 1949, latex, the buying price of which was based on current 3rd grade rubber quotations, was readily available from surrounding holdings and up to the time of writing, Haji Ahmad has operated a successful and profitable business. The full story of this pioneer scheme is dealt with in the Journal of the Rubber Reserach Institute of Malaya, Vol. 12, Communication 268.

It was not long before this scheme at Merbok attracted attention, and applications began to be submitted to the various Licensing Boards for permission to operate latex buying units. Because of the, then, lack of conclusive evidence that such schemes would prove a success, a cautious policy had necessarily to be followed and a limited number of licenses, with defined operating limits in order to prevent needless competition, was issued during 1949 to a few applicants who possessed fully acceptable evidence that:—

(a) finances were adequate,

(b) facilities existed, for the manufacture of rubber, which were capable of producing a first-class quality product,

(c) there were suitably trained personnel to undertake sampling, recording and treatment of smallholders' latex at the collection points and the final centre of processing or disposal.

Every endeavour was made to safeguard equally the interests of all concerned and accordingly certain provisos were incorporated in the licenses issued, *vide* Appendix A, page 143. By the end of 1949, approved centres had been established at Baling, Sungei Taka, Merbok (2) and at Titi Raga in the Yen district of Kedah, with an undefined number illegally operating, principally at Pendang and Singkir.

Support has been given to this development for a number of reasons, the most important being:—

(a) it opens the way to large scale production of enhanced quality rubber from smallholdings,

(b) the opportunity is provided for small primary producers to co-operate for mutual profit, and

(c) a *kampong** economy partly established on such a development has more chance of survival during a depression, when only quality products are saleable, than one associated with 3rd, 4th or 5th grade produce, the latter being a far too frequent occurrence at present.

A careful check maintained throughout 1949 on the working of the various approved centres, demonstrated fairly convincingly that bulk processing of smallholding latex was profitable except under the most adverse circumstances and, equally important, the apparatus required and the technique employed were well within the scope of Malay business men. Within broad limits therefore, it is the small primary producers who have been encouraged to pursue this development. A case does exist, however, where, provided interference with small producers' development does not result, large commercial latex buyers should not be excluded from operating, particularly the organisations which are prepared to give a guarantee that fair and reasonable warning will be issued of any intention to cease buying smallholding latex. Arguments to support this contention are:—

(a) if it is accepted that enhancement of quality in smallholding rubber is highly desirable and that bulk processing achieves this, then, whether "large" or "small" buyers do the processing is, theoretically, immaterial,

(b) the rapidly fluctuating nature of the industry requires a substantial operating capital and this the small producer unfortunately does not always possess.

It was for the above reasons that Malayan American Plantations Ltd., (Harvard Estate), who again desired to commence purchasing latex, was permitted in March and April, 1950 to open, through licensed agents, latex buying centres at Merbok, Singkir, Pendang, Tualang, Tanah Merah and Asun. It may only be a hope, but there is a possibility that once a latex selling clientele is established, the buying agents may undertake processing in their own right.

*A hamlet.

Since the inception of these buying units by Malayan American Plantations, Ltd., full co-operation has been given to the Department of Agriculture in the safe-guarding of smallholders' interests. By receiving from the Company up-to-date details regarding transactions between it and its buying agents, the task of checking up on prices received by sellers has been much simplified.

Approved centres in operation in Kedah at the time of writing are:—

(1) *Merbok*, District of Kuala Muda. Owned and operated by Haji Ahmad. This is a buying-cum-processing unit with an average daily output, since its inception in March, 1949, of 2 piculs of dry rubber, of which at least, on an average over the whole period, 66 to 70 per cent. has been 1st grade. There have been periods when this percentage was very much higher but irregularities due to the use of untrained casual labour and the tendency for this community periodically to slacken in their endeavours have not allowed this high percentage to be maintained.

(2) *Baling*, Purely a buying concern with 12 purchasing units scattered throughout the district. No processing is done by Seong Heng & Co., the operators, but the whole of the latex is disposed of to Glugor and Harvard Estates. Buying first commenced in September, 1949. The amount of latex purchased per month has averaged 20,000 gallons, equivalent to, approximately, 530 piculs of dry rubber per month.

One of the major difficulties to contend with in a large buying organisation such as this is precoagulation of the latex. Originally there were little or no anti-precoagulation measures taken but this, to some extent, has been overcome by having liquid ammonia available at each collecting centre. The problem of precoagulation has not been entirely solved, due to the wide radius of collection. It was largely because of the creping facilities offered by Glugor Estate, thereby permitting precoagulated latex to be turned into a first quality marketable product as crepe, which enabled Seong Heng & Co. to operate on an extensive scale with confidence. In contrast, producers of concentrated latex cannot generally undertake to accept latex of a d.r.c. (dry rubber content) of less than 30 per cent. nor latex showing any symptoms of precoagulation.

(3) *Sungei Taka*, District of Kulim, first began operating in October, 1949. Potentialities here are enormous, for the well equipped factory—it has a diesel engine-operated sheeting battery—is centrally situated in a good rubber area. Unfortunately, because of lawless elements, it is also a dangerous area, a fact which has precluded the close supervision an undertaking of this size requires. Notwithstanding, daily production has averaged 5 to 7 piculs of dry rubber, either in the form of smoked sheet or as, during the period at the end of 1949 when the profit margin

between 1st and 3rd grade sheet appreciably narrowed, coagulum for crepe manufacture by Glugor Estate.

(4) *Titi Raga*, District of Yen. An influential Malay from Yen, by name of Haji Isa, owning both rubber and padi interests became interested in this type of development and applied, through the Department of Agriculture, for a secured loan of $3,000 to enable him to make a start. An interest free loan was granted, and, with this money, a rubber dealer's licence was purchased, a smoke-house, a rubber factory, including aluminium coagulating tanks etc., erected and a water connection laid on to the factory. Production commenced in November, 1949, and has averaged, daily, 1½ to 2 piculs of dry rubber either as smoked sheet or coagulum, the type of end product depending on the current profit margin between 1st and 3rd grades. The loan was repaid in full in March, 1950.

(5) The six buying units organised and operated by Malayan American Plantations, Ltd. (Harvard Estate), through approved licensed agents were established during March and April, 1950. At each centre an 800 gallons tank has been installed for storage of the ammonia-treated daily collections, pending collection by tank lorry. Collectors, with 10 gallons drums, leave each centre on bicycles to meet producers and collect latex. In an attempt to prevent precoagulation, ammonia is put into the drums carried by these collectors. Payment is made to agents by Malayan American Plantations at current No. 1 R.S.S.* price less an inclusive charge, covering cess, duty and manufacturing costs, which has averaged between 6.5 and 7.8 cents per lb., depending on price fluctuations.

Details of these units are as follows:—

Name of Centre.	Situation.	Licensee.	Average daily turnover in terms of d.r.c. †
			piculs
1. Merbok	Kuala Muda	Haji Ahmad bin Omar	1½
2. Singkir	Yen	Lee Ah Kah	3½ to 4
3. Pendang	Kota Star	Baharom bin Ibrahim	2½
4. Tualang	Kota Star	Soo bin Awang Kechik	1 to 1½
5. Asun	Jitra	Yahya bin Abdullah	1½
6. Tanah Merah	Jitra	Cheah Oo Teng	1

It is not out of place to record contemporaneous developments in Perlis, a neighbouring State which, for reasons of ease in technical supervision, is linked with Kedah. The acreage of smallholding rubber in Perlis is small, 3,400 acres approximately, but nevertheless, two collection

*R.S.S. = Ribbed Smoked Sheet. † d.r.c. = dry rubber content.

and processing centres have been established, one at Beseri and the other at Mata Ayer. Both centres are, in the opinion of the writer, more elaborate than need be and the money thus invested would have served a more useful purpose had it been devoted to expansion of the businesses.

(1) *Beseri.* A local resident and ex-*Penghulu*†, Che Taib, became interested and, after a visit to Haji Ahmad's factory at Merbok, Kedah, decided to pioneer the system in Perlis. A factory and smoke-house were constructed in January and business commenced on the 8th February, 1950. At the very outset the endeavour nearly met with disaster for the promised amount of latex did not at first materialise and the smoke-house, together with 5 piculs of sheet rubber, went up in flames on the 25th February. The circumstances of the fire were very mysterious. Knowledge derived from close supervision over a period ruled out the possibility of faulty design in the smoke-house or inefficiency in its operation; what was suspicious was the entire absence of any trace of burned rubber at the scene of the fire. Sabotage, though suspected, could not be proved.

Fortunately for this pioneer effort, assistance was immediately forthcoming from the Rubber Research Institute to build an experimental thief-proof, mud-walled smoke-house and this, coupled with a rapid increase in latex purchases; up to an average of 1½ to 2 piculs of dry rubber daily, enabled Che Taib to keep going.

(2) *Mata Ayer.* Capital to the amount of $5,000 was invested in the erection of a factory, equipment and smoke-house. Business commenced on the 8th March, 1950, and for several weeks purchases were small. Turnover, now at 1 to 1¼ piculs of dry rubber daily, is still hardly enough to justify the initial heavy capital expenditure. Management is reasonably efficient and facilities exist for expansion.

The idea of selling rubber as latex in preference to processed sheet has rapidly gained favour amongst smallholders who recognise the benefits derived therefrom. As long, therefore, as the present system, which is based on d.r.c. payment at current 3rd grade quotations, remains in vogue, there probably will be no shortage of latex offered for sale. The weak link in the chain is the buyer-processor who, to achieve success, must operate not only under the most efficient conditions possible but also be possessed of a natural business acumen or "commercial experience". Even then, artificial repression of the market may narrow down 1st and 3rd grade price margins to such an extent as to make the work unprofitable.

There is no question that the phenomenal rise in the price of rubber during the past year has very considerably aided this form of development and it remains to be seen whether the various small businesses which have

†Headman.

been established on a speculative rising market favouring a delayed rather than a quick turnover, will survive and flourish once prices become stabilised. Experience in the past year has revealed that, as long as a 10 cent margin or over per lb. of dry rubber remains between 1st and 3rd grades, operators of small bulk processing schemes can expect to make a profit, admittedly less than that obtained by the buying agents for large commercial concerns, temporarily engaged in enhancing production, because of heavier capital expenditure but, against this, the former have a probability of permanency which the latter do not possess. Few of the operators can be said to possess "commercial experience" and it is feared that the recent trends in prices may have instilled a feeling of false security, particularly as regards efficiency in operation and the wisdom of maximum daily capacity of turnover. For instance, the tendency to rely on casual *kampong* labour—always the most expensive on a money/result basis—to process the bulked latex does not make for a high degree of efficiency. Again, for want of possibly a better propaganda system, certain of the processing operators do not work to full capacity, thereby proportionately increasing manufacturing costs. Finally, in a business where the difference of 1 or 2 cents per lb. spells profit or loss, the keeping of simple but accurate accounts cannot be ignored but, unfortunately, this aspect does not generally receive the attention it deserves.

To the natural question "What then is the future of this form of development?", the answer, in the opinion of the writer, is, firstly, the way is made open for smallholding rubber to compete on equal merit with estate produce, something not hitherto comprehended; secondly, a greater share of the profits returns to primary producers and, thirdly, a beneficial stabilising effect on *kampong* economy results.

There are three possibilities for future development:—

(a) collection through approved agents and processing by large commercial concerns;

(b) a co-operative movement development in the *kampong* for this purpose;

(c) a combination of (a) and (b)

In conjunction with (b), better marketing facilities must also be provided. A recent case in point is the difficulty attached to the sale of processed sheet from Beseri and Mata Ayer in Perlis. No Chinese dealer in Perlis was found willing to grade the sheet and arrangements are now being made to sell to an European agency in Sungei Patani, Kedah,—72 miles away!

It is not the desire to give the impression that the above developments have been easy work and are capable of being implemented without thorough investigation beforehand and close supervision afterwards. To quote one small instance—the determination of the d.r.c. of sellers' latex. Some smallholders prefer the "metrolac"—a type of hydrometer, use of which, in unskilled hands, is open to objection—while others favour the

"chee"* system. Whatever system is used, an unceasing watch must be kept on d.r.c. determination technique in the interests of both buyers and sellers for its accuracy determines the fairness of a deal.

Opposition to the new development has been shown by the small rubber dealer and estate owners. The former because he sees in any further large-scale development a very real threat to his livelihood and the latter, on account of alleged thieving of latex. Both these objections are probably more imaginary than real. As regards the latter, since the identity and particulars of all sellers are known and details of daily transactions are kept in writing, the reason for any sudden suspicious increase in latex offered for sale can easly be elucidated.

In conclusion, acknowledgement is made of the co-operation of the District Officers, Kuala Muda and Baling and also the very sincere efforts made by all Rubber Instructors to ensure success for the various schemes under their supervision.

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*Estimation of Dry Rubber Content—Chee System. *By permission of the Director, Rubber Research Institute of Malaya.*

The Chinese daching or opium balance graduated in tahils, chees and hoons provides a simple and accurate balance well suited to the weighing of small rubber samples. It should be noted that 1 tahil = 10 chee = 100 hoon = 37.7 gms; thus if 1 tahil of latex is coagulated, the weight of dried coagulum in hoons is a direct measure of the d.r.c. It is obviously inconvenient to weigh out 1 tahil of latex but if we note that 1 tahil of 30 to 40 per cent. field latex occupies 38.5$\pm$ 0.2 c.c. it becomes apparent that we can construct a measuring cup or dipper to contain 1 tahil of latex with an error of less than 1 per cent.

Thus d.r.c. can conveniently be estimated as the weight (in hoons) of the dried coagulum from 38.5 c.c. of field latex. This d.r.c. as percentage by weight can be converted to lbs/gall. by means of the table on Rubber Research Institute. Information Card No. 2 (1948). The 38.5 c.c. of latex can conveniently be measured in an aluminium dipper with 3.5 cms. diameter by 4 cms. height; such "tahil dippers" are obtainable from Messrs. Diethelm & Co. Ltd. of Singapore.

APPENDIX A.

Ref. D.O.B. 3/164/49.

This licence is endorsed for the purchase of Latex, and issued to Seong Heng Company of Sungei Patani, subject to the following provisos:—

1. The purchase is limited to 29.6.1369 (17.4.1950) as a trial from 1.1.1369 (23.10.1949). Further extension is subject to the scheme being proved beneficial to the smallholders, and on the recommendation of the Hon'ble State Agricultural Officer, Kedah & Perlis, and the Director, Rubber Research Institute, Kuala Lumpur.
2. The Licensee should keep proper records of all purchases from individual smallholdings inclusive of the rate paid.
3. The purchase of latex by the Licensee shall be confined to *bona fide* owners and/or lessees.
4. There shall be no dealing in stolen property.
5. No purchase should be made in areas where a scheme for improving the smallholders' rubber exists or is about to function. Such areas will be notified from time to time to the Licensee.
6. No advance should be made to the smallholders for their latex.
7. The area is confined to Baling District only. (Except Mukim Baling).
8. Not later than the 5th of every month the Licensee should forward a monthly Return of Latex purchased showing quantity obtained from each collection centre.

Sd. Syed Alwi Shahabudin,
Chairman Rubber Licensing Board,
BALING.

Dated 24.10.1949.

I agree to the foregoing conditions.

Seong Heng.
Sd. Loke Poh Seong.
Managing Proprietor.

A REPORT ON A CENSUS OF MECHANICAL FIELD EQUIPMENT IN USE ON ESTATES IN THE FEDERATION OF MALAYA, DECEMBER, 1949.

BY

E. J. H. Berwick,

Acting Senior Agricultural Officer (Research),

and

D. W. M. Haynes,

Agricultural Officer.

Introduction.

The increase in cost of labour and the greatly increased efficiency of agricultural tractors, which have taken place over the past two decades, have encouraged the use of mechanical field equipment in Malaya as elsewhere. Since 1945, the development of mechanisation has been rapid, especially on estates, and it became desirable to know the extent to which equipment was being used so that accurate figures might be available. From these figures, it would be possible to find the general trend of mechanisation which would assist the Department of Agriculture in its advisory work and emphasise the problems which need immediate investigation so that the best use could be made of the much depleted staff.

A questionnaire was therefore prepared, which was despatched by the Registrar of Statistics, Federation of Malaya, with his annual questionnaire to all rubber, coconut, oil palm and tea estates of 100 acres and over. No organisation was available to obtain returns from holdings of less than 100 acres, but it is considered that this is of little importance because few owners of such holdings own agricultural machinery at present. The questionnaire, therefore, was sent only to estates and the information given below excludes equipment owned by contractors and Government Departments.

Of the 2,480 questionnaires despatched at the beginning of December, 1949, 2,099 completed forms were received from the Registrar of Statistics in March, 1950. This was 84.6 per cent. of the total number, and may be considered to be satisfactory. The percentages given below, unless otherwise specified, are calculated on this figure of 2,099.

The questionnaire is shown in Appendix I. It will be seen that it consists of two parts; one for tractors, including excavators, and one for implements. The first part, "tractors", is then divided into types, which are again sub-divided according to horse-power. The second part, "implements", is divided into types of implements, all unspecified types being included in the category, "other implements".

The Census.

The number of estates on which mechanised field equipment is used is shown, for each State and Settlement, in Table I, and it will be seen that the total for the Federation is 186 or 8.9 per cent.

Table I.

Number and Percentage of Estates in each State or Settlement using Field Equipment.

State or Settlement. (1)	No. of estates completing return. (2)	No. of estates showing 'nil' return. (3)	No. of estates using machines. (4)	Percentage of estates using machines. (5)
Perlis ..	5	5	0	0
Kedah ..	196	177	19	9.7
Penang and P. Wellesley ..	82	63	18	22.2
Kelantan ..	39	37	2	5.1
Trengganu ..	25	25	0	0
Perak ..	445	369	77	17.3
Pahang ..	157	154	3	1.9
Selangor ..	343	317	26	7.6
Negri Sembilan ..	257	247	10	3.9
Malacca ..	156	148	8	5.1
Johore ..	394	371	23	5.8
Total	2,099	1,913	186	8.9

Table II.

Number of Estates in each State or Settlement using Tractors.

State or Settlement.	No. of estates completing return.	No. of estates using tractors.	Percentage of estates using tractors.	No. of estates using (5)				No. of estates using (6)				No. of estates using two or more types.	No. of estates using crawler and/or wheeled tractor.
				crawler tractors.	wheeled tractors.	horticultural tractors.	excavators.	crawler tractors only.	wheeled tractors only.	horticultural tractors only.	excavators only.		
(1)	(2)	(3)	(4)									(7)	(8)
Perlis ..	5	0	0.0	—	—	—	—	—	—	—	—	—	—
Kedah ..	196	14	7.1	2	5	9	—	2	3	7	—	2	7
Penang & Province Wellesley ..	82	17	20.7	1	8	13	2	—	2	9	—	6	8
Kelantan ..	39	2	5.1	—	2	—	—	—	2	—	—	—	2
Trengganu ..	25	0	0.0	—	—	—	—	—	—	—	—	—	—
Perak ..	445	55	12.4	13	21	40	7	2	6	27	—	20	27
Pahang ..	157	1	0.6	—	—	1	—	—	—	1	—	—	—
Selangor ..	343	21	6.1	2	12	10	—	1	9	8	—	3	13
Negri Sembilan ..	257	7	2.7	—	2	5	—	—	2	5	—	—	2
Malacca ..	156	7	4.5	2	3	4	—	2	1	2	—	2	5
Johore ..	394	12	3.0	5	3	8	2	3	1	5	—	3	6
Total	2,099	136	6.5	25	56	90	11	10	26	64	—	36	70

It will be seen that mechanisation is going ahead most rapidly in Penang and Province Wellesley, and Perak.

Tractors.

A considerable amount of confusion arose in cases of integral horticultural tractors, especially with self-propelled rotary cultivators, which many estates included under 'implements' whereas the intention was that they should be included as horticultural tractors. It was, however, fairly simple to identify on the returned questionnaires the category to which these rotary cultivators belonged, because, if the estate had not included in its return any wheeled tractors, then the rotary cultivator could naturally not have been a drawn implement. The figure for the total number of drawn and integral rotary cultivators was then checked with the importers against the total number known to be in Malaya. As the two totals were very close, it is considered that figures given in the tables are fairly accurate.

The number of estates on which tractors of each type are used is shown in Table II. It will be seen that the number of estates using tractors is 136 or 6.5 per cent. The difference, i.e., 50 estates, between this figure and the figure for the total number of estates using mechanised field equipment given in Table I, is caused by the many estates which use integral non-cultivation machines, such as grass-cutters and power-driven saws which are not cultivating implements. It will be further seen in Table II that of the 136 estates using tractors, 64, or 47 per cent., use horticultural tractors only and that 70, or 51.5 per cent., use what may be termed "farm tractors", either crawler or wheeled. The comparatively large number of excavators is interesting and shows that estate owners are realising the importance of drainage in coastal areas.

Table III shows the number of tractors in use in each State or Settlement, arranged according to their horse-power. In many cases, owners showed, on the questionnaire, the actual makes and models of their tractors, but, in certain cases, the tractors had been entered in the wrong horse-power category. In spite of inaccuracies slipping in in this way, it is considered that the figures do give an indication of the horse-power of the crawler and wheeled tractors most commonly in use on estates. It appears that the most common crawler-tractors used are between 25 and 50 horse-power, that the most popular wheeled tractors are of less than 35 horse-power, and that most of the horticultural tractors are in the category of 4 to 6 h.p., most of which are integral rotary hoes.

Classified Implements.

Table IV shows the number of estates using various types of tractor-implements. It will be seen that the number of estates using implements is 55, or 2.6 per cent. of all estates. The figures shown in Column 3 of Table IV should be compared with those given in Column 8 of Table II, the difference between the two indicating the number of estates on which tractors are used purely for transport purposes and not for cultivation.

The number of implements in each State or Settlement is shown in Table V. It will be noticed that there is a large number of bulldozers

Table III.

Number of tractors in use in each State or Settlement.

State or Settlement. (1)	Crawler tractors (by horse-power group) (2)						Wheeled tractors (by horse-power group) (3)				Horticultural tractors (by horse-power group) (4)			Excavators (5)
	More than 85 h.p.	65 to 85 h.p.	50 to 65 h.p.	35 to 50 h.p.	25 to 35 h.p.	Under 25 h.p.	More than 45 h.p.	35 to 45 h.p.	25 to 35 h.p.	Under 25 h.p.	6 to 10 h.p.	4 to 6 h.p.	Under 4 h.p.	
Perlis ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kedah ..	2	—	—	1	1	—	—	—	7	1	—	12	—	—
Penang & Province Wellesley ..	—	—	—	—	—	1	—	—	16	—	—	18	—	2
Kelantan ..	—	—	—	—	—	—	—	—	1	2	—	—	—	—
Trengganu ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Perak ..	2	3	2	9	13	2	1	4	26	10	7	63	9	7
Pahang ..	—	—	—	—	—	—	—	—	—	—	—	1	—	—
Selangor ..	—	—	—	3	—	1	1	—	6	10	—	9	1	—
Negri Sembilan ..	—	—	—	—	—	—	—	1	—	1	—	5	—	—
Malacca ..	—	—	—	—	2	—	—	—	1	2	1	3	—	—
Johore ..	5	—	1	4	3	1	—	7	—	4	—	10	1	2
Total ..	9	3	3	17	19	5	2	12	57	30	8	121	11	11

Table IV.

Number of Estates in each State or Settlement using various types of Tractor Implements.

State or Settlement. (1)	No. of estates completing Return. (2)	No. of estates using implements. (3)	Percentage of estates using implements. (4)	No. of estates using:—				
				dozers (5)	mould-board ploughs (6)	disc-ploughs (7)	disc-harrows (8)	rotary cultivators (9)
Perlis ..	5	—	—	—	—	—	—	—
Kedah ..	196	7	3.6	2	3	2	3	2
Penang & Province Wellesley ..	82	7	8.5	—	3	1	3	4
Kelantan ..	39	1	2.7	—	—	1	—	—
Trengganu ..	25	—	—	—	—	—	—	—
Perak ..	445	25	5.8	8	8	13	17	11
Pahang ..	157	—	—	—	—	—	—	—
Selangor ..	343	10	2.9	2	2	2	5	3
Negri Sembilan ..	257	1	0.4	—	—	—	—	1
Malacca ..	156	1	0.6	—	1	—	1	—
Johore ..	394	4	1.0	3	—	3	2	1
Total ..	2,099	56	2.7	15	17	22	31	22

in use, and that disc implements appear to be more popular than mould-board ploughs, which is possibly to be expected in the cultivation of tree crops. The unexpectedly high number of rotary cultivators in use has been caused not only by their easy availability in Malaya soon after the war but also by the fact that their draught is less than with many other implements; also, a wheeled tractor on pneumatic tyres can often work in Malaya with a rotary cultivator in conditions in which the use of any other implement would be impossible.

Other Implements.

The returns under the heading 'Other Implements' are shown in Table VI. Most of the entries under this heading would have been of little value if most estates had not entered the type and make of the implement concerned. Many returns showed, under this heading, changkols, hoes and other tools, but these have been omitted and, where no other machinery was owned, the estate was included as a "nil" return. Out of the total of 186 other implements, 114, or 61.3 per cent., were grass cutters and 21, or 11.3 per cent., power chain saws. The remaining implements specified included such machines as road graders, road rollers, winches, spraying equipment etc.

Conclusions.

It is considered that the census has fulfilled its purpose and gives valuable information on, (a), the types and numbers of machines in use, and, (b), the general trend of mechanisation, from which can be inferred the type of operations undertaken mechanically. The former is of interest to the agricultural engineer and to manufacturers and agents, but the latter is probably more important to the agronomist, as it can serve as a guide for future research work and as an index to the value of work already published. For example, the large number of rotary cultivators employed throughout the country points to the need for fundamental research into the advantages and disadvantages of this drastic method of cultivation in the tropics. Again, the large proportion of track-layers used for clearing work underlines the importance of work already published on the felling, stumping and cultivation of rubber and oil palms and emphasises the need for continued research into the fundamentals of drainage and into the mechanical problems of constructing drains under the adverse conditions that often exist after felling and stumping by mechanical means.

Proposals for Future Work.

It is suggested that with the rapid increase in mechanisation now taking place, the census might well be carried out annually, for at any rate a period of some 3 years. In the light of experience obtained in analysing the 1949 census, some modifications to the questionnaire must clearly be made, mainly with the object of avoiding confusion. A new form of questionnaire, which it is considered would be better adapted to the purpose, is attached as Appendix II.

Table V.

Number of Implements in use in each State or Settlement.

State or Settlement. (1)	Bulldozer attachments (2)	Mould-board ploughs (3)	Disc-ploughs (4)	Disc-harrows (5)	Rotary cultivators (6)
Perlis ..	—	—	—	—	—
Kedah ..	3	5	3	6	3
Penang & Province Wellesley ..	—	2	2	3	6
Kelantan ..	—	—	1	—	—
Trengganu ..	—	—	—	—	—
Perak ..	22	10	22	41	13
Pahang ..	—	—	—	—	—
Selangor ..	4	4	2	6	3
Negri Sembilan ..	—	—	—	—	1
Malacca ..	1	1	—	1	—
Johore ..	11	—	4	8	2
Total ..	41	22	34	65	28

Table VI.

Number of Other Machines in use in each State or Settlement.

State or Settlement	Grass Cutters	Power Chain Saws	Others.
Perlis ..	Nil	Nil	Nil
Kedah ..	11	4	12
Penang & Province Wellesley ..	20	2	3
Kelantan ..	Nil	Nil	Nil
Trengganu ..	Nil	Nil	Nil
Perak ..	48	9	18
Pahang ..	1	Nil	2
Selangor ..	13	1	4
Negri Sembilan ..	5	2	3
Malacca ..	3	1	1
Johore ..	13	2	8
Total ..	114	21	51
Grand Total ..		186	

Appendix I.

Census of Mechanical Cultivation Equipment, 1949.

The Department of Agriculture is taking a census of agricultural mechanical equipment in the Federation, and has asked me to assist by sending out the questionnaire below to all estates.

2. I would ask you, therefore, to complete and return this form to me when forwarding your Annual Questionnaire. It will be of considerable assistance if you will make a "nil" return if you have no mechanical equipment.

H. L. BARNETT,
Registrar of Statistics,
Federation of Malaya.

Kuala Lumpur,
1st December, 1949.

AGRICULTURAL TRACTORS:	H.P.	**Number**
Track Tractors		
	85 and over	.....
	65 — 85	.....
	50 — 65	.....
	35 — 50	.....
	25 — 35	.....
	below 25	.....
Wheeled Tractors	45 and over	.....
	35 — 45	.....
	25 — 35	.....
	below 25	.....
Horticultural Tractors	6 — 10	.....
	4 — 6	.....
	below 4	.....
Excavators		.....
AGRICULTURAL IMPLEMENTS:		
Bulldozer blade		.....
Mould-board ploughs		.....
Disc ploughs		.....
Disc harrows		.....
Rotary cultivators		.....
Other implements		.....

Name of Estate ..... Ref. No. .....
Address .....
.....

Appendix II.

Census of Mechanical Cultivation Equipment, 1950.

The Department of Agriculture is taking a census of agricultural mechanical equipment in the Federation, and has asked me to assist by sending out the questionnaire below to all estates.

2. I would ask you, therefore, to complete and return this form to me when forwarding your Annual Questionnaire. It will be of considerable assistance if you will make a "nil" return if you have no mechanical equipment. If you have any comments to make, will you please write them on the back of the form.

Registrar of Statistics,
Federation of Malaya.

Kuala Lumpur,
1st December, 1950.

FARM TRACTORS	Number	FARM TRACTOR IMPLEMENTS	Number
Excavators		Bulldozer blades	
Crawler Tractors:		Root rakes	
Bristol		Graders	
Caterpillar D 6,7,or 8:		Rollers	
D 4.		Ditching ploughs	
D 2.		Mould board ploughs	
International,			
TD 14, 18 or 24		Disc ploughs	
TD 9		Disc harrows	
TD 6		Rotary Cultivators	
Other makes:		Grass Cutters	
....		Sprayers	
....		Other implements:	
....		....	
Wheeled Tractors:		....	
Farmall		....	
Ferguson		....	
Fordson		....	
Other Makes:		....	
....		....	
....		....	

Horticultural Tractors:	Other Machines:
Gem Rotary Hoe	Allen Autoscythe .....
Trusty Tractor	Lloyds Autosickle .....
Anzani Iron Horse	Power Saws .....
Ransomes M.G. 2 or 5	Other Machines:
Others:	
....	....
....	....

Name of Estate	Planted acreage .....
Address	Crops planted .....
.....	.....

PIG IMPROVEMENT IN THE SETTLEMENT OF PENANG

BY

LEE SIN FOOK,

Chinese Agricultural Assistant, Penang and Province Wellesley.

Pig rearing has long been an established industry among the Chinese peasants. It forms the backbone of the ordinary farmer's economy in conjunction with market gardening, partially or wholly supplying the gardener's requirements of manures. As the flesh of the pig forms almost the entire meat portion of the diet of the Chinese, pig rearing must be reckoned as being of great economic importance and has therefore received every encouragement from the Department of Agriculture.

The common pig kept is the black, or grey-and-white piebald Chinese type, whose sows are well known for their prolificacy and excellent milking qualities. The chief disadvantage of the Chinese pig, however, is its slow live-weight gain which is primarily attributed to continued indiscriminate in-breeding. Breeding from immature boars and sows is a common practice and in-breeding, entirely through ignorance, is an undisputed factor contributing to the general degeneration of the Chinese pig to its present undesirable state.

While the Chinese pig is undoubtedly capable of being improved by breeding and selection, even greater gains can be achieved by cross-breeding —the mating of European breed boars with local Chinese sows. It has been conclusively found that the progeny of Middle White boar X Chinese sow inherit nearly all the characteristics of the sire. The hollow back and flat pasterns of the Chinese pig are replaced by the straight back and well developed pasterns of the Middle White. These improved characteristics result in an increase in the proportion of the carcase to live-weight and also an increase in the more valuable parts of the carcase. It has also been found that such crosses possess very good growth characteristics, forming carcases most suitable for the present market requirements. The trend of demand is now in favour of a leaner type of pork than was popular in this country in the past.

The practice of mating purebred Middle White boars with Chinese sows was started in Penang before the War as part of the first move towards improving the local pigs and was increasingly gaining in popularity between 1938 and 1941 when it was unfortunately interrupted by the War. During the Japanese occupation of Malaya, the condition of pigs deteriorated again, and the pig population dropped sharply because of the shortage of suitable foodstuffs.

It was not until after the liberation of Malaya that encouragement of the above mentioned cross-breeding was re-started in the Settlement. This work called for three lines of action, namely (a), the encouragement of rearers to bring sows for service by Middle White boars reared at Ayer Itam Agricultural Station, Penang; (b), the encouragement of outright

purchases of Middle White boars by the larger breeders in areas with a high pig population; and (c), the loan of Departmental boars to remote areas.

At the beginning, numerous difficulties were encountered. Most rearers were doubtful if cross-bred pigs could be successfully raised under their system of feeding and condition of housing, and there was a strong contention among them that European breeds could only be raised under ideal housing conditions and on special rations. Fortunately, however, a few rearers had some previous experience and knowledge of Middle Whites and had watched feeding trials carried out at the Ayer Itam Agricultural Station before the War.

In February, 1947, a herd of Middle Whites, transferred from the Agricultural Station, Cameron Highlands, was started at Ayer Itam Agricultural Station. Three mature boars were also brought from Cameron Highlands for sale, as breeding boars, to local rearers. In July, 1947, a further consignment of 10 boars arrived and were also sold to rearers. Meanwhile, at the Ayer Itam Agricultural Station, more and more rearers in the vicinity were persuaded to bring in their sows to be served. The response was poor to start with, but, towards the end of 1947, when the earlier served sows had their first cross-bred litters, the demands for services rose. Early in 1948, the first litters began to pass through the Ayer Itam abattoir and for them a premium was paid by butchers who were able to obtain a much higher percentage of carcase to live-weight and were able to obtain ready sale of the meat. Favourable reports soon spread, and conducted tours were arranged to enable rearers to visit and inspect the herd at Ayer Itam Agricultural Station and also farms with cross-bred litters. Rearers were not slow to appreciate the superior all-round qualities of the cross-breds and by the end of 1948, 20 boars had been purchased outright and the numbers of recorded services, both private and Government, were 556 and 77 respectively. In 1949, limited funds made it impossible for breeding to continue at the Station and all the breeding sows were sold, only two boars being retained at stud. Subsequent demands for breeding boars from the rearers were met as far as possible by importations from Cameron Highlands.

In addition to the advantages of cross-breds over the Chinese pigs already enumerated, the rearers also discovered that cross-breds were easier to manage and not so temperamental or subject to going off-feed. The spaying of gilts, normally done with Chinese pigs, was also found to be unnecessary in the case of cross-breds, owing to the earlier marketing age, thus saving professional operation fees and capital loss through faulty operations. Cross-breds were also found to be easily marketable at all ages.

In the initial stage of distribution of weaner boars, the choice of suitable and reliable breeders to purchase them was of great importance. Farms were inspected and the financial and geographical position of the would-be purchaser investigated, as it was imperative that boars should be in their possession long enough to produce significant results. The choice of locality aimed at as wide a distribution as possible in the most

PLATE I.
Typical Chinese sow on a Penang Pig Farm.

PLATE II.
Middle White boar at Ayer Itam Agricultural Station, Penang.

PLATE III.

Chinese sow with part of her half-bred (cross Middle White) litter.

PLATE IV.

Half-bred sow (Chinese cross Middle White) with part of her three-quarter-bred litter (cross Middle White).

densely populated pig-rearing centres. Because of prevailing short supplies of weaner boars from Cameron Highlands and to assist in dealing with the increasing demands, a few of the larger and more experienced breeders were allowed to purchase gilts, with the object of using them as breeding sows. The keeping of pure-bred Middle Whites as a pork-producing proposition was discouraged from the start because the sows were rarely known to become good milkers or to produce large litters under local conditions. There were many litters of pure-bred Middle Whites raised through the distribution of gilts and many boars thus produced were privately sold for breeding. The accompanying table shows the recorded number of boars and gilts distributed and the number of services made, but the actual figures are undoubtedly much higher as no record is available of boars privately distributed or of services made by them.

Distribution of Pure-Bred Middle White Pigs

Period	Boars Distributed	Gilts Distributed	Recorded Services		
			Private	Government	Total
Up to end 1948 ..	20	9	556	77	633
1st. Quarter, 1949 ..	5	3	536	34	570
2nd. Quarter, 1949 ..	8	2	617	15	632
3rd. Quarter, 1949 ..	8	10	710	20	730
4th. Quarter, 1949 ..	12	7	861	18	879
1st. Quarter, 1950 ..	11	15	990	3	993
2nd. Quarter, 1950 ..	10	13	1,398	6	1,404
TOTAL	74	59	5,668	173	5,841

Cross-breeding has become an established practice in the Settlement to-day. Rearers prefer the services of Middle White studs to the Chinese boars notwithstanding the higher stud fees being charged. Professional boar-keepers are gradually replacing their Chinese boars with Middle Whites in order to meet the demand and also to meet competition from other keepers.

Progress made in the three years is evidenced by the fact that to-day, more than 90 per cent. of the pigs in Ayer Itam consist of crossbred Middle Whites, followed by the Bayan Lepas locality with some 70 per cent., Jelutong with nearly 50 per cent., and that approximately 40 per cent. of the pigs passing through the Penang Municipal Abattoir are crossbred Middle Whites. In order to serve the growing demands of pig keepers on the mainland, future extension programmes will include the establishment of a breeding station at Bukit Mertajam in Province Wellesley.

MECHANIZATION.

Quarterly Progress Report, April to June, 1950.

Compiled by the Acting Senior Agricultural Officer (Research) and the Agricultural Officer (Engineering)

Recent Importations.

The following tractors and implements were received during the period under review:—

Ferguson TED 20 (Kerosene) tractor.
Ferguson Rotovator.
Ferguson Disc-terracer.
Ferguson RD8-20 Disc-harrow.
Ferguson manure loader and spreader.
Ferguson "Weeder".
Ferguson tractor jacks.
Ferguson steel wheels.
Ransome T.S.41 "Supertrac" M.B. 4-furrow plough.

Tests and Modifications.

Ferguson Implements.

Most of the newly acquired Ferguson equipment did not arrive until the beginning of June, and exhaustive tests have not yet been possible.

A Ferguson tractor has been in use on heavy, clay, padi land near Kuantan, and both pneumatic and steel wheels have been used. As previously reported for Province Wellesley, the tractor developed a higher pull when fitted with steel wheels with standard lugs, but it was liable to become bogged because lugs dug away the soil. With pneumatic tyres, the wheels tended to spin, without breaking through the surface pan. Once again the 16 ins. single-furrow digger-plough proved to be the most successful plough.

The Rough Duty 8-20 harrow consists of a heavy framework mounted on the lift arms, carrying eight 20 ins. discs. The cutting angle of the discs is altered by a simple adjustment, while the depth of work is controlled by the hydraulic lift. The harrow was used with cut-away discs on both ploughed and unploughed land. On heavy, ploughed land the maximum penetration was about 4 ins. but at this depth the tractor was only able to work in bottom gear, and it was found that a more satisfactory soil tilth was obtained if the tractor was driven faster in 2nd gear, with the discs at about 2 to 2½ ins. working depth. On unploughed land with a heavy surface growth, it was found that penetration was poor and the soil was only slightly disturbed. It was found essential to lift the harrows over surface timbers, because the severe jolting deranged the internal control linkages of the hydraulic lift.

The Ferguson Disc-ridger, obtained during the previous quarter of the year, has done excellent work in the padi fields in the off-season under conditions in Province Wellesley. In one case, beds 3½ ft. wide and 1½ ft. high were made and planted with sweet potato, soya beans and groundnuts after some superficial trimming with a *changkol**. Working in very awkward, small areas, ¾ acre was ridged in 1 hour with a fuel consumption of about 1½ gallons of petrol.

The Ferguson "Weeder", which consists of three rows of small spring-tynes, was used at Serdang for removing *Mimosa* from pasture. It was found that a considerable amount of *Mimosa* was "combed" out and it is thought that the regular use of this implement may prove a simple method of controlling this weed.

"Paddle-Wheels" for the Farmall "H" tractor.

The Farmall "H" three-wheeled row-crop tractor is considerably lighter for its power than a conventional general purpose machine, so in order to test fully its potentialities on padi land, a set of adaptors was made for the rear axle so that modified wheels, designed for the Fordson Major, might be fitted.

As it had been found that the open "paddle-wheels" had a considerable cultivating effect, a small pair of conical paddles were made to replace the front wheel in order that a complete strip 9 ft. wide might be covered. It was found that the vegetation was crushed and some superficial cultivation done, but penetration was not great, and, in sticky conditions, both the front and rear wheels became filled with mud.

Gem Rotary Hoe, with Large Diameter Wheels.

This machine was modified by the makers for work under padi conditions by fitting large diameter, narrow rimmed wheels and an appropriate reduction gear in the final drive. Where a pan existed near the surface, good work was done at a cost of about $8.50 per acre, but when the pan was deeper or non-existent the machine was unmanageable.

Ransome Supertrac Plough.

This is a large digger-plough, turning 4 furrows, each 16 ins. wide. The maximum depth of work is 18 ins. but, using a D7 tractor in 2nd gear, the maximum depth obtainable at the Federal Experiment Station, Serdang, under fairly dry conditions, was 13 ins. The furrows were neat and well inverted, and the plough was not seriously affected by the presence of the boles of old oil palms.

Safety Hitches.

An automatic safety hitch fitted to a 2-furrow McCormick Deering plough was tested in Province Wellesley in an area where there were numerous stumps and timbers. About 4 acres were ploughed, the safety hitch never failing to release when a stump was encountered. On the same area the body of a direct-mounted plough was broken in two pieces by a stump.

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*A broad and deep hand-hoe.

Mitchell Combine Seed-Drill.

The modified combine drill with drum wheels 15 ins. wide was tested in padi fields on coastal clay. Various methods of sowing both soaked and unsoaked seed were compared. It was found that soaked seed gave better establishment than unsoaked, although in both cases few seeds germinated in the tracks made by the tractor; the best results were obtained when the seed tubes were removed.

Planet Junior Seeder Units.

Two of these units, mounted behind a Ransomes M.G.5, were used to sow soya beans. The seed-plate was selected to give a spacing of about 3 ins. and germination was even. These seeders appear to be suitable for this type of work, especially where they can be mounted on the tool-bar that is to be used for subsequent cultivations.

Prototype Header Unit.

The prototype header unit made in Kelantan was tried out during the padi harvest. Although only a limited area was harvested, the results were encouraging, and further development work is planned before the next harvest. The heads cut by the unit were threshed in a Robinson Midget thresher. Threshing was simple and economical, and a moderately good sample was obtained after winnowing.

McCormick Deering 52R Combined Harvester.

The Combine, pulled by a TD 6 tractor, was tested in wet padi in Province Wellesley. Only a short trial was possible owing to frequent bogging, but the grain sample, though fairly satisfactory, was inferior to that obtained from the Midget Thresher in Kelantan.

Allen 25A Autoscythe.

This machine, fitted with a special offset cutter-bar and swathe-board, designed for padi harvesting, was made available through the local agents. It was found to be an improvement over the standard machine, but the collection and handling of padi cut by mowing machines always present great difficulty.

Rust Prevention.

A trial of certain methods of protecting the bright parts of machinery against the weather during short and long periods has been commenced.

Investigations into Wet Padi Cultivation.

Coastal Clays.

Two experiments have been laid down on a large area in Province Wellesley to test different methods of off-season cultivation. In addition, 12 acres of land at Bukit Merah Padi Experiment Station were prepared for planting the 1950 off-season padi crop by various tractor/implement combinations. Some difficulties, both agricultural and non-agricultural, were met with, but three different tractors, with a variety of implements, were used and some interesting comparative costs obtained.

In Kelantan, experimental work on the preparation of padi land with horticultural tractors has been completed, and two new trials have been laid down, one comparing different depths of cultivation with and without chiselling, and the other, the effect of ploughing-in fertilisers at different depths.

'Muck' Soils.

An off-season cultivation experiment is being laid down at Tanjong Karang on a padi area where some 6 to 12 ins. of peat overlie a heavy clay. Various cultivations are being done with Fordson Tractors with standard equipment, and different crops will be planted.

Investigations into Dry Land Cultivation.

MECHANICAL OPERATIONS PREPARATORY TO PLANTING.

Coastal Clays.

Ditching has proceeded on the 30 acres drainage experiment on an estate in Selangor. Periodic rainstorms have again interfered with the work, but it is hoped that the laying down of the experiment will soon be completed.

Peat Soils.

Investigations into the difficulties likely to be encountered when clearing virgin areas of peat soils have been completed.

A survey was made on 4 quarter-acre blocks of unfelled jungle near the Chenderong Balai Experiment Station and the number of trees, stumps and fallen timbers recorded. It was found that, out of a total of 95 trees and stumps, 63 were under 12 ins. in diameter, 13 between 12 and 19 ins. and 19 over 19 ins. Thirty stumps in cleared land were then pulled out with a Trewhella winch, coupled to a dynamometer. No stumps of less than 13½ ins. diameter could be found as they had all been removed during the original clearing. The minimum pull recorded was 4,400 lbs. (for a stump of 13½ ins.) and the maximum 26,000 lbs. (for a stump of 30½ ins.). The mean of 30 readings was 15,700 lbs.

An area of peat is now being excavated to determine the number of submerged timbers, but work is hampered by the high water level.

Dynamometer tests showed that the maximum sustained pull of a D-4 tractor, with modified 34 ins. tracks, on uncultivated peat was reduced from 7,200 lbs. to 5,100 lbs. in wet conditions. The average draught of two different disc-harrows on the same area was 1,700 lbs., but, although this is far lower than the maximum pull developed by a D-4 tractor under these conditions, bogging was frequent.

Inland Soils.

The costs of the terracing trial on quartzite soil, carried out at the Federal Experiment Station, Serdang, during the previous quarter of the year, are now available. A total length of 145 chains (17 terraces), varying from 10 to 12½ ft. in width, were completed at a cost of $4.30 per

chain. This figure does not include surveying, marking out, or supervision, but depreciation and maintenance of tractors and implements have been taken into account.

Inter-Row Cultivation.

Rubber.

The two inter-row cultivation and drainage experiments on an estate in Selangor, mentioned in the last quarterly report, were completed.

General.

During April and May, a five-weeks course for tractor operators was held at the Federal Experiment Station, Serdang. Eight operators from estates and four from Government Departments attended lectures and practical demonstrations given by the Officer-in-Charge, Workshop and Pool, and his assistants. Although these courses are considered to be of great importance, no more will be held until staffing difficulties have been overcome at the Federal Experiment Station, Serdang.

The results of a census of mechanical cultivation equipment in use on rubber, coconut, oil palm and tea estates of more than 100 acres, obtained with the co-operation of the Registrar of Statistics, were analysed.

NOTES ON CURRENT INVESTIGATIONS, APRIL TO JUNE, 1950.

Compiled by the Acting Chief Research Officer and the Acting Senior Agricultural Officer (Research).

Padi.

Records of variety trials have been received from Padi Experiment Stations and are being analysed in conjunction with the results of the work of the two previous years. Ear-row selection records in respect of the varieties Radin Ebos (Kedah), Mayang Sa-Batil (Penang), Siam (Malacca) and Seraup (Krian) have been analysed, and selection continued by discarding poor-producing and weak-strawed lines. Serendah Kuning and Nachin varieties were dealt with in the report for the 1st quarter of the year. The numbers of lines retained for next season is as follows, the original numbers being shown in brackets.

Nachin	(1,000)	75 for the 4th year
Serendah Kuning	(1,200)	67 ,, ,,
Radin Ebos	(1,000)	373 for the 3rd year
Mayang Sa-Batil	(500)	188 ,, ,,
Siam	(757)	456 for the 2nd year
Seraup	(1,000)	704 ,, ,,

Harvesting of all the 1949-50 season agronomic trials was completed and most of the results have been received, but it has not yet been possible to prepare a complete summary. The programme of investigation for the 1950-51 season was designed to continue previous experiments which were either inconclusive or planned to run for a period of years, and to make new trials of a general nature, principally with reference to manuring, from which it is expected to obtain guidance for planning more detailed experiments in future. It is desired to determine whether such factors as type of fertiliser, mode of application and time of application, either singly or in conjunction, have any bearing on the lack of response of padi to fertilisers which has so often been the results of past experiments. An attempt was made to co-ordinate experimentation on such points as optimum sowing dates and methods of cultivation which, in previous years, were approached on a State or Settlement basis.

Investigation into the growing of off-season crops and its effect was continued after the padi harvest on a greater scale than previously but there were early failures due to lack of rain. It is evident that off-season crops will often be impossible unless irrigation is available in the off-season. Very successful crop production is achieved, mainly by Chinese, between the padi seasons in certain areas which lend themselves to it. The new padi area of Tanjong Karang, Selangor, is one on which very good off-season crops are grown, and here a limitation is the length of time in which crops can be grown. As muck soil makes for easy mechanical cultivation,

trials have been started of the rapid preparation of land for smallholders, and manurial experiments have been combined with mechanical cultivation for off-season crops.

The spectacular increase in yield of dry padi in Kelantan from the use of mono-ammonium phosphate is being followed up by new trials, mainly in conjunction with mechanical cultivation.

After harvesting a pot experiment in which padi was grown on peat with various N, P and K treatments, reported previously in this Journal, the pots were emptied and the peat allowed to dry out. After refilling, the straw, with the surface peat, was burnt off, with the exception of the pots previously treated with ammonium sulphate, and irrigation recommenced. Transplanted padi began to show yellowing after about three months and a severe attack by stem borers developed. A dressing of sulphate of ammonia to the row of pots previously having a triple dressing of potash produced an immediate improvement. In another row a slight improvement was obtained by temporary suspension of irrigation and aeration of the peat. The treatments applied in the first experiment had some residual effect as the yields were again superior to that of the control, especially nitrogenous manuring, but the average was much below that reached when the fresh peat was used. Despite the residual effect of the original fertilisers it seemed that drying out of the peat had a markedly adverse effect.

A pot experiment has been set up with soil from poor yielding, inland padi fields, for the purpose of further investigating the influence of trace elements. In the first stage a crop of padi is being grown without any treatments being applied in order to assess the regularity of growth.

Further trials of the possibility of controlling padi stem borers with insecticides have been concluded. Application of insecticides in the field has given no evidence of success in reducing borer attack, and if anything is to be gained by the use of the supposed "systemic" phosphorus insecticides it appears that their mode of action will have to be studied under laboratory conditions.

Cocoa.

In pursuance of clonal selection from Departmental plantations of Trinitario type cocoa, preparations are advanced for a second and larger clonal trial. A large number of plants raised from cuttings from 20 selected trees will be planted at an early date for comparative trial, and advantage will be taken of experience gained in the first clonal trial regarding the requisite amount of shade. A setback occasioned in the first trial has been largely rectified. A budwood area containing material from the 20 selected trees has been successfully established and should be ready for use within a few months.

Breeding from selected trees at Serdang has given families of seedlings both of Forastero and Criollo types which were planted in a comparative trial with West African Amelonado seedlings. It is expected that a further number of pedigree families, at least 30, will be available for planting out at Serdang. All the better trees at Serdang and Cheras have now been

classified as self-compatible or otherwise; the numbers being 15 and 24 respectively.

The resources of Criollo material in Malaya are being explored. Criollo trees growing in kampongs in Negri Sembilan, Malacca, Johore, Perak, Penang and Province Wellesley, Kedah and Perlis were examined, and enquiries were made as to their origin. Over 80 trees were chosen as the best representatives, and budwood from them was used to bud unselected Trinitario stocks at Serdang. Pods were also collected and the seed is being germinated for the purpose of planting up an area for further investigation.

A series of propagation beds have been constructed at the Federal Experiment Station, Serdang, with controlled overhead spray irrigation, for further trial of this method of rooting cuttings and eventually to accelerate their production. These beds will be brought into service as soon as a large supply of cuttings becomes available from the cutting wood nurseries, which are already well established.

Nearly 50 trial plots and experiments have been planted on estates and Agricultural Stations since the inception of the investigations for the purpose of discovering the best methods of establishing cocoa under Malayan conditions. No very marked drought has so far occurred, but the following generalisations may be made on the basis of observations up to the present:—

(i) It is clear that cocoa thrives best in jungle or semi-jungle conditions and that the establishment of a good stand of cocoa is more easily and cheaply attained from jungle than from *belukar** or old rubber land.

(ii) It seems probable therefore that tertiary shade of some sort will be required. If jungle trees or saplings are already growing on the area, they should be left. If there are no trees, then seedlings of several different species should be planted in preference to a single species, so that, if a pest or desease should attack one species, the others will remain.

(iii) The main difficulty in establishing cocoa on non-jungle areas lies in the severe damage often caused by night flying cockchafers (*Apogonia* and other spp.). Although they can be killed by stomach poison such as lead arsenate, it appears that a circle of palm fronds, placed around each plant, not only acts as an effective barrier to the beetles but also creates the still and humid atmosphere around the cocoa in which it grows extremely well. Not only can cocoa grow satisfactorily in fairly open areas when surrounded by fronds in this way, but also it appears that cocoa which has suffered severely from beetle damage and desiccation, in many cases, can make a very creditable recovery after being protected.

(iv) The general object in the establishment of cocoa is to maintain a still and humid atmosphere and all cultivation should be towards this end. For example, it is considered that, except where damage

*Secondary jungle growth.

by beetle is very severe, circle weeding around the cocoa plants will be preferable to clean weeding. In the same way nothing should be done which is likely to cause a sudden change in the environment of the cocoa. For example, if it is decided that a primary or secondary shade is competing too severely with the cocoa, its removal or cutting back should be done in several stages and not in one operation.

(c) It is only in exceptional circumstances that cocoa can easily be established in old rubber areas.

In the field trials of cocoa up to the present, the objective has been to discover in what environment the plants make most satisfactory growth, in other words to learn how to grow cocoa in this country. Manuring has been done in a general way as circumstances appeared to dictate, and deliberately planned manurial experiments are considered premature. Observations have been made, and in a clonal trial at Serdang a small monthly dressing of a different manure was applied to each of five similar blocks. All dressings containing nitrogen produced a considerable improvement, the least response being in the block receiving potash and phosphate only.

Comparative trials of the imported West African Amelonado variety with local Trinitario have been laid down at nine centres. An area of 5 acres at Serdang has been planted with Amelonado for eventual seed production.

A study of deficiency symptoms in cocoa plants was commenced in order that they might be recognised against symptoms of disease of transmissible character. Amongst Trinitario plants growing in nutrient solution, those without nitrogen are beginning to deteriorate after 15 months, plants without phosphate died in 6 months, those without calcium died in 7 months and those without magnesium are moribund. On the other hand, plants without potash have made good growth, and those with excess potash died in 6 months.

Oil Palms.

The controlled pollination of selected palms for the production of pedigree seed continues. The experiment of breeding palms for oil of high carotene content, initiated 13 years ago, has been abandoned on account of poor success and disappearance of its *raison d'être*. Selections were made of palms of West African *tenera* type on the basis of highly pigmented oil and reasonable yield, and the selected palms were selfed or crossed. The progeny were planted out before the war but, as would be now expected, the mature palms turned out to be about 25 per cent. sterile and to a similar degree thick-shelled with negligible pericarp. Of the palms to be considered as producers of oil, not more than 10 per cent. produced oil of intensity of colour above the minimum upon which selection of the parents was based, and only 2 per cent. reached the standard of the best parents. It is not considered that the objective, an oil of relatively high vitamin A potency, justifies any further attempts at breeding for high carotene oil. It has been confirmed in fresh experiments that oil palms growing in culture solutions thrive better at pH 3.5 than at pH 6.5. Three families of pedigree

palms growing in rows side by side at Serdang exhibit different degrees of bronzing of the leaves, respectively very severe, slight, and little or none. Immediately before a programme of manuring, leaf analysis was performed for the three families and will be repeated at regular intervals. The first results showed the average potash contents of the leaf ash to be respectively 26.5, 31.1 and 36.8 per cent. A disease of young plants in nurseries causing withering and rotting has been recorded, but associated organisms have not been proved responsible.

Tea.

Cuttings have been taken from the previously selected tea bushes at Serdang, in numbers from 80 to 180 per bush, for clonal propagation, the first objective being determination of rooting capacity. In the experiments, started some time ago, to compare the performance of cuttings and seedlings, mortality has so far been higher among the seedlings. At Cameron Highlands, pre-treatment yields are being recorded on two areas preparatory to manurial trials. Good success is attending the establishment of Ladino clover as a cover crop amongst tea bushes. The appearance of Blister Blight *Exobasidium vexans* at the end of February was followed by rapid spread in the Highlands area despite attempts at early eradication. Control and precautionary measures have been recommended to growers. Records are being kept of the incidence of the disease and its relation to climatic conditions. The fungi present on the blisters are being studied. At Serdang, the copper content of tea leaf is still being studied in relation to the application of copper solutions to the soil. An increase is still observed for several pluckings after the treatment, but falls subsequently.

Soya Bean.

Field trials of selected strains at Serdang were successful, with 9 strains giving more than 1,200 lbs. per acre. The fungus *Sclerotium Rolfsii* is a major disease but has been kept under control. Selected strains are also being used in experiments on off-season crops in padi fields.

Coconut.

In a drainage and inter-cultivation experiment at Port Swettenham, the treatments have been split for three sub-treatments, grazed, moved, and harrowed. The grazing is controlled by electric fencing.

Fibres.

Manila hemp.

A varietal trial at Serdang, which was not very successful in spite of heavy application of fertilisers, produced stems long enough for extraction of fibre only from imported varieties, but these varieties yielded fewer stems than the local types. At Port Swettenham, mechanical cultivation has progressed well after a very long period of inaction due to persistent rainfall, which rendered the coastal clay unworkable by machinery. The long deferred Manila hemp cultural and manurial experiment is therefore likely to be started at an early date.

Jute.

Two species of jute, *Corchorus capsularis* and *C. olitarius* have grown sufficiently well to suggest that there are prospects for the crop on good soil. It is being planted for trial as an off-season crop on certain padi areas.

Ramie.

Guided by observations in earlier and not very successful experiments, new experiments have been laid down on a Selangor peat area to test various combinations of fertilisers on burnt and unburnt peat.

Fodders.

The four experiments at Serdang continue, and a fifth, a manurial trial with fresh strains of Napier grass, has been planted. A manurial trial with Napier, Guinea and Guatemala grass, as at Serdang, has been laid down at Pekan, Pahang.

Stylosanthes gracilis which was recently introduced from Australia was planted at Kota Bahru and Melor Agricultural Experiment Stations in Kelantan and also at the Federal Experiment Station, Serdang. As a fodder it is liked by cattle and corresponds closely in chemical composition to *Calapogonium mucunoides*. There are indications that it would serve as a smother crop to suppress undesirable species, but an obstacle to its rapid propagation is its reluctance to flower and seed.

Trials with 18 strains of imported white and red clover are being planted at Cameron Highlands.

Pasture.

Established pasture plots have been divided into two, one to be grazed and one to give records of cut herbage at monthly intervals. In an experiment with shade versus no shade, higher yields are being obtained from the shaded areas, and *Axonopus affinis* is now producing 40 per cent. more green matter than *A. compressus*. In an experiment to establish pasture grass by discing-in planting material, Dallis grass *(Paspalum dilatatum)* gave the best results, Serangoon grass (*Digitaria didactyla*) and *Brachearia* were slow growing but satisfactory, while *Axonopus* was a failure. In another trial, a field of lalang was grazed at monthly intervals and mowed immediatley after grazing, with the result that the lalang is being suppressed and replaced by good grasses. Experiments in the control of *Mimosa pudica* in pasture are showing that it is controlled more effectively and cheaply by mechanical means than by hormone weed killers.

Linseed.

Linseed (*Linum usitatissimum*) is said to flower as a weak plant in Singapore, but no seed is known to have been obtained. It has been grown in the mountains of Java. Seed for trials was received from Victoria, Australia, in 1947. The crop was a complete failure at Serdang, but did well in a series of experiments at Cameron Highlands. These experiments showed that

(a) good crops may be obtained at most times of the year;

(b) the seed rate should be in the order of 80 lbs. per acre, i.e. 6 ins. between the rows;

(c) it reacts favourably to N.P.K. manuring.

Chemical analysis showed that

(a) the seeds remained very constant in size whatever the sowing date; the oil content showed the usual range of variations and the average was 41.3 per cent. of the dry seeds;

(b) the physical and chemical characteristics of the oil varied within the usual range, except that the average iodine value was 174.1 and therefore very slightly below the usual minimum;

(c) the linseed cake was of normal composition and high feeding value.

It has been shown, therefore, that linseed is a potentially satisfactory crop at Cameron Highlands. Attempts to popularise its cultivation revealed that no one was willing to produce it on a commercial scale owing to lack of suitable flat land and because vegetables would give a better economic return.

Soils.

The analysis has continued of soil samples taken in the survey of the Trans-Perak Irrigation Scheme, and still indicates extensive areas of non-peaty soil. Samples have also been received from the Paya Temai area of East Pahang, also a potential padi area. An investigation of the sulphur content of coastal soils has been commenced, following observations of surprisingly large amounts in clay underlying peat. Some coastal clays contain over 1 per cent. of sulphur, and a sample of surface soil from a bare patch of *gelam* soil at Pulau Gadong Experiment Station, Malacca, contained 3.6 per cent. of sulphur. A study is continuing of biological and chemical methods designed to determine the amounts of available phosphate and potash in soil. A record of soil conditions is being maintained during the progress of various field agronomic experiments.

Livestock.

The programme of selection and breeding of Chinese pigs at Serdang is reaching a stage at which it may be said that the pigs, while retaining the hardiness and fecundity of their type, have a greatly improved performance in live-weight gain, weaned-weight, and carcase. A trial of out-door rearing in a grass paddock with atap shelters and electric fences is having a beneficial effect.

Accommodation for goats has been enlarged at Serdang for the purpose of increasing the numbers of pure-bred imported strains by breeding and crossbreeding imported bucks and local does under continuous observation.

Poultry experiments are in hand to compare imported and local fowls under the same conditions of management and feeding. A comparison of Rhode Island Reds and Australorps conducted on two Agricultural Stations in Selangor showed that, of the two strains, Rhode Island Reds gave better rates of growth and egg records, whereas Australorps came into lay earlier.

Departmental Notes.

Appointment.

The Right Honourable the Secretary of State for the Colonies has been pleased to approve the appointment of Mr. A. E. Billington as Canning Officer, Malayan Agricultural Service, with effect from the 12th April, 1950. Mr. Billington arrived in Malaya on the 6th May, 1950, and is stationed at Johore Bahru.

Promotion.

The Right Honourable the Secretary of State for the Colonies has been pleased to approve the promotion of Mr. H. K. Ashby, Agricultural Officer, Malayan Agricultural Service, to be Senior Agricultural Officer, Malayan Agricultural Service, with effect from the 28th November, 1949.

Transfers.

Dr. W. N. Scott, Agricultural Officer, has been appointed to act as Principal, College of Agriculture with effect from the 14th July, 1950.

Mr. A. L. Barcroft, Agricultural Officer, Malacca, has been appointed to act as State Agricultural Officer, Negri Sembilan, in addition to his other duties, with effect from the 1st July, 1950.

Leave.

Mr. O. M. Lee, Senior Lecturer, College of Agriculture, has been granted 180 days leave with effect from 13th July, 1950.

MARKET PRICES

April to June, 1950.

Rubber.—During the second quarter of 1950, the Singapore price of No. 1 R.S.S., f.o.b., in bales, buyer, increased to 96 cents per lb. on the 7th June, fell back to 71 cents in the middle of the month and closed at 79¾ cents.

The price on the 1st April, 1950, was 57¾ cents per lb., increasing to 76¼ cents on the 29th and giving an average price for April of 66.2 cents per lb. During May the price increased from 76½ cents on the 1st to 91½ cents per lb. on the 31st, giving an average for the month of 79.85 cents per lb. June commenced with the price at 94½ cents and closed at 79¾ cents, the average price for the month being 82.23 cents per lb.

The average prices paid for smallholders' rubber at three centres in the Federation of Malaya during the second quarter of 1950, are given in Table I.

Table I.

Average Monthly Prices Paid by Local Dealers for Smallholders' Rubber, April to June, 1950.

(Dollars per picul of 133⅓ lbs.)

Grades	Taiping, Perak.			Seremban, Negri Sembilan.			Batu Pahat, Johore.		
	Apr.	May.	June.	Apr.	May.	June.	Apr.	May.	June.
Smoked Sheet ..	76.50	92.50	101.50	81.50	98.75	100.50	73.13	85.80	93.75
Unsmoked Sheet ..	67.00	80.00	90.00	65.00	80.00	87.00	68.38	81.00	86.20
Scrap ..	37.50	35.00	40.00	36.00	41.00	45.00	21.25	21.90	24.60

Transport from Batu Pahat to Singapore by lorry, excluding duty, 80 cents per picul.

Tea.—The average price paid in Colombo for Malayan tea, as quoted in the Colombo Brokers' Association weekly report dated 11th July, 1950, was Rs.1.67 per lb. The average prices of Ceylon teas were as follows, in rupees per lb.: High Grown Teas Rs.1.71, Medium Grown Teas Rs.1.52, Low Grown Teas Rs.1.73.

Ceylon teas are subject to an export duty but non-Ceylon teas sold at auctions ex-bond in Colombo for re-export are not subject to this duty.

The retail price for Malayan tea (Boh) continues to be $2.25 per lb.

Palm Oil.—The majority of Malayan estate production of this commodity continues to be sold to the United Kingdom Ministry of Food. There has been no change in the price payable to producers of £74 per ton, f.o.b. Singapore. The 5 per cent. *ad valorem* Malayan export duty is for sellers' account.

Derris.—There was no change in the price of this commodity during the second quarter of the year. The weekly reports of the Singapore Chamber of Commerce have shown the price at $85 per picul.

Tobacco.—The average prices paid per picul for cured leaf in Kelantan during the second quarter of 1950, were as follows:—1st quality $426, 2nd quality $264 and 3rd quality $180.

Rice.—The ration of rice continues to be 3½ katis per person per week. Rice can now be purchased in three grades at the following prices per picul: High Grade $33, Medium Grade $26 and Low Grade $22.

Table II.

Singapore Prices of Various Agricultural Products.

(Dollars per picul)

Date	Copra, Sundried	Coconut oil*	Pepper. F.A.Q. Muntok white	Pepper. Gen. Muntok white	Gambier, Cube	Sago Flour, Lingga	Tapioca Flour No. 1	Oilcake, Round
1950								
3rd Apr.	37.50	62.00	860.00	870.00	65.00	14.25	16.75	15.00
11th Apr.	37.00	62.00	855.00	865.00	65.00	14.25	17.00	14.00
17th Apr.	37.50	62.50	865.00	875.00	65.00	14.25	17.00	14.00
24th Apr.	37.50	63.00	870.00	880.00	65.00	15.00†	16.50	14.00
1st May.	38.75	63.50	865.00	875.00	65.00	17.00	16.50	14.00
8th May.	38.50	62.50	850.00	855.00	66.00	16.00	16.50	15.00
15th May.	38.25	62.50	865.00	875.00	66.00	15.75	16.50	15.00
22nd May.	38.25	62.00	850.00	860.00	65.00	16.00	16.75	15.00
30th May.	37.50	62.00	835.00	845.00	66.00	17.00	16.75	15.00
5th June.	36.50	61.50	825.00	830.00	65.00	18.00	16.75	15.00
12th June.	34.25	59.00	765.00	775.00	66.00	18.00	17.25	15.50
19th June.	34.00	58.00	705.00	715.00	66.00	17.50	17.25	15.00
26th June.	32.50	56.50	740.00	750.00	66.00	17.25	17.50	15.00

*F.O.B. †Nominal

The above prices are taken from the weekly report of the Singapore Chamber of Commerce.

FEDERATION OF MALAYA

PRODUCTION OF PALM OIL AND KERNELS.

(In long tons as declared by Estates)

Month	Palm Oil		Palm Kernels	
	1949	1950	1949	1950
January ..	3,793.0	3,958.5	799.9	896.0
February ..	4,007.0	3,643.1	821.4	969.9
March ..	4,055.6	4,860.6	860.1	1,184.0
April ..	3,999.3	4,918.5	808.3	1,249.0
May ..	4,120.9	4,433.0	809.2	1,086.3
June ..	4,321.5	4,226.4	791.2	1,070.0
July ..	4,461.3		931.0	
August ..	4,398.2		906.0	
September ..	4,234.9		858.9	
October ..	4,125.5		875.3	
November ..	4,504.3		994.1	
December ..	4,539.2		1,004.0	
Total ..	50,560.7	(26,040.1)	10,459.4	(6,455.2)

In June 48 estates (planted area 88,989 acres) were in production out of a total of 54 oil palm estates (planted area 91,155 acres).

MALAYAN AGRICULTURAL EXPORTS, JANUARY-MARCH, 1950.

Product	Net Exports in Tons.			
	Year 1948	Year 1949	Jan.-Mar. 1949	Jan.-Mar. 1950
Arecanuts	6,043	5,607	3,233	7,616
Coconuts fresh†‡ ..	44,887†	21,971†	525†	13,643†
Coconut oil‡	45,245	60,504	11,257	14,106
Copra‡	28,625*	24,424*	4,076*	1,720*
Copra cake	12,176*	27,643*	5,270*	8,095*
Gambier, all kinds ..	286	293	44	183
Palm kernels	6,462	8,744	2,001	2,293
Palm Oil	46,821	55,211	18,425	14,171
Pineapples, canned ..	4,073	8,130	1,497	3,829
Rubber¶	696,978¶	670,257¶	173,530¶	161,572¶
Sago,—flour	16,946*	1,476	186*	1,590
„ —pearl	19,084	3,477	1,976	310
„ —raw	6,667*	1,317*	720*	659*
Tapioca,—flake	304	737	115	174
„ —flour	1,999*	278*	259*	728*
„ —pearl	14,263	12,345	416	3,456
Derris	80	48	3	17
‡Copra equivalent ..	45,795	74,334	14,288	21,475

¶ production (Federation of Malaya). † hundreds in number. * net imports.

FEDERATION OF MALAYA RUBBER PRODUCTION.

(In long tons, dry weight)

Month	Estates		Smallholdings (Estimated)		Total	
	1949	1950	1949	1950	1949	1950
January ..	36,397	35,237	24,052	26,440	60,449	61,677
February ..	27,593	27,297	17,450	22,645	45,043	49,942
March ..	33,616	27,789	20,309 14,113†	21,688 476†	53,925 14,113†	49,477 476†
April ..	28,142	26,667	16,744	22,409	44,886	49,076
May ..	33,570	30,870	18,499	25,898	52,069	56,768
June ..	32,921	31,196	18,683 2,705†	23,169‡	51,604 2,705†	54,365‡
July ..	35,751		20,137		55,888	
August ..	36,658		20,504		57,162	
September ..	33,828		24,900*		58,728*	
October ..	30,788		20,096		50,884	
November ..	35,169		23,825		58,994	
December ..	35,576		23,977 4,254†		59,553 4,254†	
Total ..	400,009	(179,056)	270,248	(142,725)	670,257	(321,781)
Total 1948 ..	402,907		294,071		696,978	

Smallholding production is estimated from purchases reported by dealers.

† Quarterly adjustment.

* Includes quarterly adjustment (deduction of 822 tons).

‡ Includes quarterly adjustment (deduction of 3,370 tons).

FEDERATION OF MALAYA

PRODUCTION OF COPRA, COCONUT OIL AND COPRA CAKE.

(in tons)

Month	Copra Production						Coconut Oil Production		Copra Cake (Poonac) Manufactured	
	Estates		Smallholdings (estimated)		Total		Oil Mills		Oil Mills	
	1949	1950	1949	1950	1949	1950	1949	1950	1949	1950
January ..	2,476	2,577	7,406	7,765	9,882	10,342	4,727	5,501	3,245	3,634
February ..	2,605	2,662	5,544	6,868	8,149	9,530	4,429	4,831	3,027	3,182
March ..	2,644	3,064	4,981	7,062	7,625	10,126	4,638	5,774	3,211	3,798
April ..	2,755	3,002	6,203	7,367	8,958	10,369	4,832	4,847	3,325	3,201
May ..	3,039	3,424	5,884	10,160	8,923	13,584	4,995	6,507	3,437	4,341
June ..	3,500	3,761	6,723	9,109	10,223	12,870	5,607	6,373	3,756	4,176
July ..	3,838		6,915		10,753		5,710		3,870	
August ..	3,867		8,676		12,543		5,671		3,858	
September ..	3,651		9,256		12,907		6,282		4,190	
October ..	2,778		7,745		10,523		5,440		3,711	
November ..	3,035		9,332		12,367		5,736		3,871	
December ..	2,769		7,315		10,084		5,631		3,799	
Total ..	36,957	(18,490)	85,980	(48,331)	122,937	(66,821)	63,698	(33,833)	43,300	(22,332)

Notes:—1. The above statistics are compiled and published by the Registrar of Statistics, Federation of Malaya.

2. Estate copra production and coconut oil production are as declared by estates and oil mills respectively.

3. Statistics of smallholding coconut oil production are not available.

4. Smallholding copra production for commercial purposes is estimated from the formula: imports + estate stocks (opening) + estate production + smallholding production = exports + local oil mill consumption + estate stocks (closing).

METEOROLOGICAL SUMMARY, MALAYA, MARCH, 1950.

Locality	Air Temperature degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine		
	Means of			Absolute Extremes									Number of days							
	A. Max.	B. Min.	Means of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot °F	At 4 feet °F	Total		Most in a day Amt.	Precipitation .01 in or more	Precipitation .04 in or more	Thunderstorm	Fog morning obs.	Gale force 8 or more	Total	Daily Mean	Per cent.
										ins.	mm.	ins.						hrs.	hrs.	
Ipoh, Perak ..	92.3	72.5	82.4	96	70	82	75			9.61	244.1	2.07	18	16	4			230.40	7.43	
Port Swettenham, Selangor	90.2	72.5	81.3	94	70	87	75	85.9	85.8	8.61	218.7	1.71	18	14	10			207.75	6.70	
K. Lumpur, Selangor ..	91.2	73.3	82.3	94	71	87	75			12.95	328.9	2.20	21	20	9	7				
Sitiawan, Perak ..	89.6	72.4	81.0	92	71	84	75	84.8		5.02	127.5	0.97	13	13	7			205.95	6 64	
Kuala Lipis, Pahang ..	89.2	72.0	80.6	92	69	78	75	84.1	83.5	6.26	159.0	2.73	15	12	2	17		194.20	6.26	
Kuantan, Pahang ..	88.0	71.6	79.9	92	67	78	75			17.69	449.3	8.09	15	14				196.20	6.33	
Temerloh, Pahang ..	90.5	73.3	81.9	93	71	79	77			5.16	131.1	1.35	17	12		4		194.20	6.26	
Bayan Lepas, Penang ..	89.6	75.0	82.3	93	71	87	80			2.14	54.4	0.55	11	11	4			243.20	7.85	
Malacca ..	88.5	73.6	81.1	93	71	84	76			8.23	209.0	2.48	14	11	2			215.50	6.95	
Mersing, Johore ..	85.1	73.5	79.3	88	70	82	79			11.90	302.3	7.53	16	14	1			228.85	7.38	
Alor Star, Kedah ..	93.0	72.1	82.5	96	69	87	74			3.83	97.3	0.77	10	9	5		1	278.25	8.97	
Kota Bharu, Kelantan ..	87.8	73.4	80.6	92	70	81	77	86.8		3.01	76.5	1.30	8	5		3		275.55	8.89	
K. Trengganu, Trengganu	86.5	72.9	79.7	89	71	80	78			3.77	95.8	1.53	9	7		3	2	263.10	8.49	
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft. ..	73.5	62.4	67.9	77	59	66	64	72.4		8.49	215.6	1.54	23	16	1	18		155.15	5.00	
Cameron Highlands, Tanah Rata, Pahang 4750 ft.	64.4	54.8	59.6	79	48	69	62	67.7	69.4	6.40	162.6	1.42	14	17				161.45	5.21	

Compiled from Returns supplied by the Malayan Meteorological Service.

METEOROLOGICAL SUMMARY, MALAYA, APRIL, 1950.

Locality	Air Temperature degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine		
	Means of			Absolute Extremes									Number of days							
	A. Max.	B. Min.	Means of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot °F	At 4 feet °F	Total		Most in a day Amt.	Precipitation .01 in or more	Precipitation .04 in or more	Thunderstorm	Fog morning obs.	Gale force 8 or more	Total	Daily Mean	Per cent.
										ins.	mm.	ins.						hrs.	hrs.	
Ipoh, Perak ..	91.8	73.4	82.6	94	70	85	76			14.76	374.9	1.80	22	19	9	1	2	196.65	6.55	
Port Swettenham, Selangor	89.5	73.9	81.7	92	71	87	75	85.7	85.6	14.72	373.9	3.03	19	19	5			174.75	5.83	
K. Lumpur, Selangor ..	90.1	74.0	82.1	93	72	86	75			12.80	325.1	3.07	22	21	10	4				
Sitiawan, Perak ..	89.3	73.3	81.3	91	70	86	76	85.3		9.69	246.1	2.38	14	12	4			205.15	6.84	
Kuala Lipis, Pahang ..	89.0	72.1	80.5	92	70	82	73	84.5	84.3	16.02	406.9	1.81	26	23	10	21		177.95	5.93	
Kuantan, Pahang ..	90.0	72 4	81.2	93	71	84	76			11.09	281.7	2.32	19	18	21	2		179.20	5.97	
Temerloh, Pahang ..		73.8			72		75			10.00	254.0	2.60	17	14	2	5		168.30	5.61	
Bayan Lepas, Penang ..	87.9	75.1	81.5	91	72	84	77			16.70	424.2	3.10	23	22	11			199.60	6.65	
Malacca ..	86 3	73.9	80.1	90	71	82	76			9.25	235.0	2.30	16	13	2			204.15	6.81	
Mersing, Johore ..	86.7	72.6	79.7	90	71	78	75			6.99	177.5	1.31	17	13	1			195.45	6.51	
Alor Star, Kedah ..	90.2	74.0	82.1	94	71	86	75			10.50	266.7	2.42	20	15	6			227.70	7.95	
Kota Bharu, Kelantan ..	88.4	74.7	81.5	93	73	77	76	87.1		11.01	279.7	4.09	15	13	4	1	1	236.30	7.88	
K. Trengganu, Trengganu	88.2	73.3	80.7	90	71	81	75			5.06	128.5	2.40	14	11	1	1		238.40	7.95	
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft. ..	74.1	62.8	68.5	77	61	66	64	72.7		10.49	266.4	1.90	24	21	7	12		140.60	4.69	
Cameron Highlands, Tanah Rata, Pahang 4750 ft.	73.8	58.1	65.9	77	53	70	62	68.2	69.6	11.03	280.2	1.50	24	20	1			132.25	4.41	

Compiled from Returns supplied by the Malayan Meteorological Service.

METEOROLOGICAL SUMMARY, MALAYA, MAY, 1950.

Locality	Air Temperature degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine		
	Means of			Absolute Extremes						Total		Most in a day	Number of days					Total	Daily Mean	Per cent.
	A. Max.	B. Min.	Means of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot °F	At 4 feet °F			Amt.	Precipitation .01 in or more	Precipitation .04 in or more	Thunderstorm	Fog morning obs.	Gale force 8 or more			
										ins.	mm.	ins.						hrs.	hrs.	
Ipoh, Perak ..	90.0	73.7	82.9	95	71	88	76			11.70	297.2	2.22	17	15	7			202.40	6.53	
Port Swettenham, Selangor	89.3	73.9	81.6	93	72	84	76			5.48	139.2	2.44	13	11	2			175.05	5.65	
K. Lumpur, Selangor ..	89.6	74.2	81.9	94	72	84	76			6.80	172.7	1.15	19	14	8	5				
Sitiawan, Perak ..	90.2	73.7	81.9	95	72	85	76	85.6		5.16	131.1	2.79	11	8	4	1		187.15	6.04	
Kuala Lipis, Pahang ..	88.8	72.5	80.7	93	69	83	75	84.7	84.9	14.18	360.2	2.24	20	18	3	23		177.05	5.71	
Kuantan, Pahang ..	89.9	73.3	81.6	93	71	83	76			6.92	175.8	3.08	15	13	4	1		167.10	5.39	
Temerloh, Pahang ..		73.6			72		76			4.43	112.5	0.95	13	13	3	7		183.75	5.93	
Bayan Lepas, Penang ..	87.7	75.3	81.5	91	73	84	78			12.74	323.6	3.80	21	17	10			185.25	5.97	
Malacca ..	80.9	74.5	80.2	91	73	82	76			6.71	170.4	2.75	17	14	4			210.85	6.80	
Mersing, Johore ..	87.7	73.0	80.3	90	72	84	75			5.25	133.4	1.05	16	13	3		1	182.90	5.90	
Alor Star, Kedah ..	88.8	74.3	81.5	93	72	85	77			13.52	343.4	2.73	16	13	2			197.90	6.38	
Kota Bharu, Kelantan ..	88.7	75.1	81.9	91	73	85	78	87.0		4.50	114.3	1.88	11	8	—			214.10	6.91	
K. Trengganu, Trengganu	89.0	73.8	81.4	92	72	84	76			5.09	129.3	1.53	10	8	4			203.45	6.56	
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft. ..	75.2	63.1	69.1	78	61	71	65	72.9		13.15	334.0	2.47	22	21	7	15		151.75	4.89	
Cameron Highlands, Tanah Rata, Pahang 4750 ft.	77.5	56.5	64.5	79	54	71	63	68.8	70.1	10.56	268.2	1.28	28	21	—	—		140.50	4.53	

Compiled from Returns supplied by the Malayan Meteorological Service.